User Manual

Allen-Bradley

PowerFlex 520-Series Adjustable Frequency AC Drive

PowerFlex 523 Catalog Number 25A
PowerFlex 525 Catalog Number 25B

Original Instructions

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation® sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

⚠	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
⚠	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
⚡	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
⚠	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
⚠	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

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This manual contains new and updated information.

New and Updated Information

This table contains the changes made to this revision.

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Updated Catalog Number Explantion tables	13
Updated Fuses and Circuit Breaker information	22
Added PowerFlex 523 Fuses and Circuit Breaker tables	23…25
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Added PowerFlex 523 Control I/O Terminal Block diagram and Designations table	40…41
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Updated Certifications table with PowerFlex 523 information	Throughout Appendix A
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Overview

The purpose of this manual is to provide you with the basic information needed to install, start-up and troubleshoot the PowerFlex® 520-Series Adjustable Frequency AC Drive.

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Who Should Use this Manual

This manual is intended for qualified personnel. You must be able to program and operate Adjustable Frequency AC Drive devices. In addition, you must have an understanding of the parameter settings and functions.

Recommended Documentation

All the recommended documentation listed in this section is available online at http://www.rockwellautomation.com/literature.

The following publications provide general drive information:

Title	Publication
Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives	DRIVES-IN001
Preventive Maintenance of Industrial Control and Drive System Equipment	DRIVES-TD001
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control	SGI-1.1
A Global Reference Guide for Reading Schematic Diagrams	100-2.10
Guarding Against Electrostatic Damage	8000-4.5.2

The following publications provide specific PowerFlex 520-Series information on drive installation, features, specifications, and service:

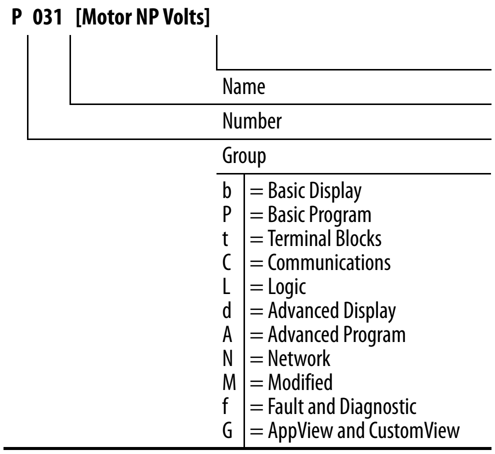
Title	Publication
PowerFlex 520-Series AC Drive Specifications	520-TD001
PowerFlex Dynamic Braking Resistor Calculator	PFLEX-AT001
PowerFlex AC Drives in Common Bus Configurations	DRIVES-AT002

The following publications provide specific Network Communications information:

Title	Publication
PowerFlex 525 Embedded EtherNet/IP Adapter	520COM-UM001
PowerFlex 25-COMM-D DeviceNet Adapter	520COM-UM002
PowerFlex 25-COMM-E2P Dual-Port EtherNet/IP Adapter	520COM-UM003
PowerFlex 25-COMM-P Profibus Adapter	520COM-UM004

Manual Conventions

- In this manual we refer to PowerFlex 520-Series Adjustable Frequency AC Drive as; drive, PowerFlex 520-series, PowerFlex 520-series drive or PowerFlex 520-series AC drive.
- Specific drives within the PowerFlex 520-series may be referred to as:
  – PowerFlex 523, PowerFlex 523 drive or PowerFlex 523 AC drive.
  – PowerFlex 525, PowerFlex 525 drive or PowerFlex 525 AC drive.
- Parameter numbers and names are shown in this format:



b = Basic Display
P = Basic Program
t = Terminal Blocks
C = Communications
L = Logic
d = Advanced Display
A = Advanced Program
N = Network
M = Modified
f = Fault and Diagnostic
G = AppView and CustomView

- The following words are used throughout the manual to describe an action:

Words	Meaning
Can	Possible, able to do something
Cannot	Not possible, not able to do something
May	Permitted, allowed
Must	Unavoidable, you must do this
Shall	Required and necessary
Should	Recommended
Should Not	Not Recommended

- The Studio 5000™ Engineering and Design Environment combines engineering and design elements into a common environment. The first element in the Studio 5000 environment is the Logix Designer application. The Logix Designer application is the rebranding of RSLogix 5000 software and will continue to be the product to program Logix 5000 controllers for discrete, process, batch, motion, safety, and drive-based solutions. The Studio 5000 environment is the foundation for the future of Rockwell Automation engineering design tools and capabilities. It is the one place for design engineers to develop all the elements of their control system.

Drive Frame Sizes

Similar PowerFlex 520-series drive sizes are grouped into frame sizes to simplify spare parts ordering, dimensioning, etc. A cross reference of drive catalog numbers and their respective frame sizes is provided in Appendix B.

General Precautions

ATTENTION: The drive contains high voltage capacitors which take time to discharge after removal of mains supply. Before working on drive, ensure isolation of mains supply from line inputs [R, S, T (L1, L2, L3)]. Wait three minutes for capacitors to discharge to safe voltage levels. Failure to do so may result in personal injury or death.
Darkened display LEDs is not an indication that capacitors have discharged to safe voltage levels.

ATTENTION: Only qualified personnel familiar with adjustable frequency AC drives and associated machinery should plan or implement the installation, start-up and subsequent maintenance of the system. Failure to comply may result in personal injury and/or equipment damage.

ATTENTION: This drive contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference A-B publication 8000-4.5.2, "Guarding Against Electrostatic Damage" or any other applicable ESD protection handbook.

ATTENTION: An incorrectly applied or installed drive can result in component damage or a reduction in product life. Wiring or application errors, such as undersizing the motor, incorrect or inadequate AC supply, or excessive ambient temperatures may result in malfunction of the system.

ATTENTION: The bus regulator function is extremely useful for preventing nuisance overvoltage faults resulting from aggressive decelerations, overhauling loads, and eccentric loads. However, it can also cause either of the following two conditions to occur.
1. Fast positive changes in input voltage or imbalanced input voltages can cause uncommanded positive speed changes;
2. Actual deceleration times can be longer than commanded deceleration times
However, a "Stall Fault" is generated if the drive remains in this state for 1 minute. If this condition is unacceptable, the bus regulator must be disabled (see parameter A550 [Bus Reg Enable]). In addition, installing a properly sized dynamic brake resistor will provide equal or better performance in most cases.

ATTENTION: Risk of injury or equipment damage exists. Drive does not contain user-serviceable components. Do not disassemble drive chassis.

Catalog Number Explanation

1-3	4	5	6-8	9	10	11	12	13	14
25B	**–**	**B**	**2P3**	**N**	**1**	**1**	**4**	**–**	**–**
Drive	Dash	Voltage Rating	Rating	Enclosure	Reserved	Emission Class	Reserved	Dash	Dash

Code	Type
25A	PowerFlex 523
25B	PowerFlex 525

Code	Voltage	Phase
V	120V AC	1
A	240V AC	1
B	240V AC	3
D	480V AC	3
E	600V AC	3

Code	Enclosure
N	IP20 NEMA / Open

Code	Interface Module
1	Standard

Code	EMC Filter
0	No Filter
1	Filter

Code	Braking
4	Standard

Output Current @ 1 Phase, 100…120V Input

Code	Amps	Frame	ND		HD	
			HP	kW	HP	kW
1P6(1)	1.6	A	0.25	0.2	0.25	0.2
2P5	2.5	A	0.5	0.4	0.5	0.4
4P8	4.8	B	1.0	0.75	1.0	0.75
6P0	6.0	B	1.5	1.1	1.5	1.1

Output Current @ 1 Phase, 200…240V Input

Code	Amps	Frame	ND		HD	
			HP	kW	HP	kW
1P6(1)	1.6	A	0.25	0.2	0.25	0.2
2P5	2.5	A	0.5	0.4	0.5	0.4
4P8	4.8	A	1.0	0.75	1.0	0.75
8P0	8.0	B	2.0	1.5	2.0	1.5
011	11.0	B	3.0	2.2	3.0	2.2

Output Current @ 3Phase, 200…240V Input

Code	Amps	Frame	ND		HD	
			HP	kW	HP	kW
1P6(1)	1.6	A	0.25	0.2	0.25	0.2
2P5	2.5	A	0.5	0.4	0.5	0.4
5P0	5.0	A	1.0	0.75	1.0	0.75
8P0	8.0	A	2.0	1.5	2.0	1.5
011	11.0	A	3.0	2.2	3.0	2.2
017	17.5	B	5.0	4.0	5.0	4.0
024	24.0	C	7.5	5.5	7.5	5.5
032	32.2	D	10.0	7.5	10.0	7.5
048(2)	48.3	E	15.0	11.0	15.0	11.0
062(2)(3)	62.1	E	20.0	15.0	15.0	11.0

Output Current @ 3 Phase, 380…480V Input

Code	Amps	Frame	ND		HD	
			HP	kW	HP	kW
1P4	1.4	A	0.5	0.4	0.5	0.4
2P3	2.3	A	1.0	0.75	1.0	0.75
4P0	4.0	A	2.0	1.5	2.0	1.5
6P0	6.0	A	3.0	2.2	3.0	2.2
010	10.5	B	5.0	4.0	5.0	4.0
013	13.0	C	7.5	5.5	7.5	5.5
017	17.0	C	10.0	7.5	10.0	7.5
024	24.0	D	15.0	11.0	15.0	11.0
030(2)(3)	30.0	D	20.0	15.0	15.0	11.0
037(2)(3)	37.0	E	25.0	18.5	20.0	15.0
043(2)(3)	43.0	E	30.0	22.0	25.0	18.5

Output Current @ 3 Phase, 525…600V Input

Code	Amps	Frame	ND		HD	
			HP	kW	HP	kW
0P9	0.9	A	0.5	0.4	0.5	0.4
1P7	1.7	A	1.0	0.75	1.0	0.75
3P0	3.0	A	2.0	1.5	2.0	1.5
4P2	4.2	A	3.0	2.2	3.0	2.2
6P6	6.6	B	5.0	4.0	5.0	4.0
9P9	9.9	C	7.5	5.5	7.5	5.5
012	12.0	C	10.0	7.5	10.0	7.5
019	19.0	D	15.0	11.0	15.0	11.0
022(2)(3)	22.0	D	20.0	15.0	15.0	11.0
027(2)(3)	27.0	E	25.0	18.5	20.0	15.0
032(2)(3)	32.0	E	30.0	22.0	25.0	18.5

(1) This rating is only available for PowerFlex 523 drives.

(2) This rating is only available for PowerFlex 525 drives.

(3) Normal and Heavy Duty ratings are available for drives above 15 HP / 11 kW.

Notes:

Chapter 1

Installation/Wiring

This chapter provides information on mounting and wiring the PowerFlex 520-series drives.

For information on...	See page...
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Start and Speed Reference Control	49
CE Conformity	51

Most start-up difficulties are the result of incorrect wiring. Every precaution must be taken to assure that the wiring is done as instructed. All items must be read and understood before the actual installation begins.

ATTENTION: The following information is merely a guide for proper installation. Rockwell Automation cannot assume responsibility for the compliance or the noncompliance to any code, national, local or otherwise for the proper installation of this drive or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored during installation.

Mounting Considerations

- Mount the drive upright on a flat, vertical and level surface.

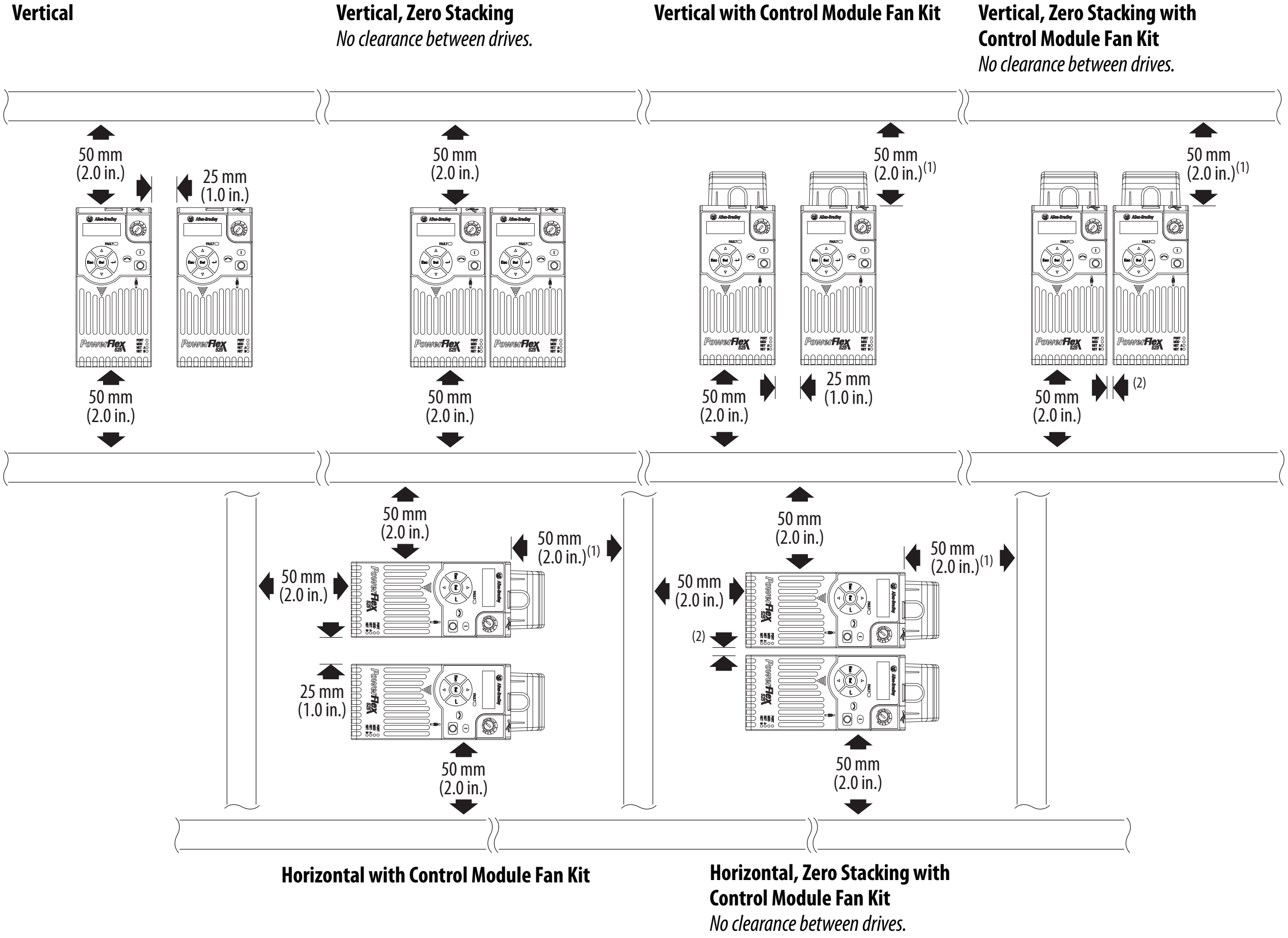
Frame	Screw Size	Screw Torque
A	M5 (#10...24)	1.56...1.96 Nm (14...17 lb-in.)
B	M5 (#10...24)	1.56...1.96 Nm (14...17 lb-in.)
C	M5 (#10...24)	1.56...1.96 Nm (14...17 lb-in.)
D	M5 (#10...24)	2.45...2.94 Nm (22...26 lb-in.)
E	M8 (5/16 in.)	6.0...7.4 Nm (53...65 lb-in.)

- Protect the cooling fan by avoiding dust or metallic particles.

- Do not expose to a corrosive atmosphere.
- Protect from moisture and direct sunlight.

Minimum Mounting Clearances

See Appendix B for mounting dimensions.


Vertical
50 mm (2.0 in.)
25 mm (1.0 in.)
50 mm (2.0 in.)
Vertical, Zero Stacking
No clearance between drives.
50 mm (2.0 in.)
50 mm (2.0 in.)
Vertical with Control Module Fan Kit
50 mm (2.0 in.)(1)
50 mm (2.0 in.)
25 mm (1.0 in.)
Vertical, Zero Stacking with Control Module Fan Kit
No clearance between drives.
50 mm (2.0 in.)(1)
50 mm (2.0 in.)
(2)
50 mm (2.0 in.)
50 mm (2.0 in.)(1)
50 mm (2.0 in.)
25 mm (1.0 in.)
50 mm (2.0 in.)
50 mm (2.0 in.)
50 mm (2.0 in.)(1)
50 mm (2.0 in.)
(2)
50 mm (2.0 in.)
Horizontal with Control Module Fan Kit
Horizontal, Zero Stacking with Control Module Fan Kit
No clearance between drives.

(1) For Frame E with Control Module Fan Kit only, clearance of 95 mm (3.7 in.) is required.
(2) For Frame E with Control Module Fan Kit only, clearance of 12 mm (0.5 in.) is required.

Ambient Operating Temperatures

See Appendix B for option kits.

Mounting	Enclosure Rating(1)	Ambient Temperature			
		Minimum	Maximum (No Derate)	Maximum (Derate)(2)	Maximum with Control Module Fan Kit (Derate)(3)(5)
Vertical	IP 20/Open Type	-20 °C (-4 °F)	50 °C (122 °F)	60 °C (140 °F)	70 °C (158 °F)
	IP 30/NEMA 1/UL Type 1		45 °C (113 °F)	55 °C (131 °F)	–
Vertical, Zero Stacking	IP 20/Open Type		45 °C (113 °F)	55 °C (131 °F)	65 °C (149 °F)
	IP 30/NEMA 1/UL Type 1		40 °C (104 °F)	50 °C (122 °F)	–
Horizontal with Control Module Fan Kit(4)(5)	IP 20/Open Type		50 °C (122 °F)	–	70 °C (158 °F)
Horizontal, Zero Stacking with Control Module Fan Kit(4)(5)	IP 20/Open Type		45 °C (113 °F)	–	65 °C (149 °F)

(1) IP 30/NEMA 1/UL Type 1 rating requires installation of the PowerFlex 520-Series IP 30/NEMA 1/UL Type 1 option kit, catalog number 25-JBAx.

(2) For catalogs 25x-D1P4N104 and 25x-E0P9N104, the temperature listed under the Maximum (Derate) column is reduced by 5 °C (9 °F) for all mounting methods.

(3) For catalogs 25x-D1P4N104 and 25x-E0P9N104, the temperature listed under the Maximum with Control Module Fan Kit (Derate) column is reduced by 10 °C (18 °F) for vertical and vertical with zero stacking mounting methods only.

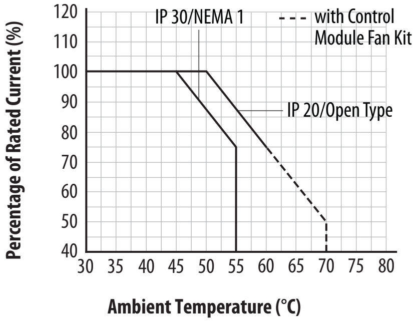
(4) Catalogs 25x-D1P4N104 and 25x-E0P9N104 cannot be mounted using either of the horizontal mounting methods.

(5) Requires installation of the PowerFlex 520-Series Control Module Fan Kit, catalog number 25-FANx-70C.

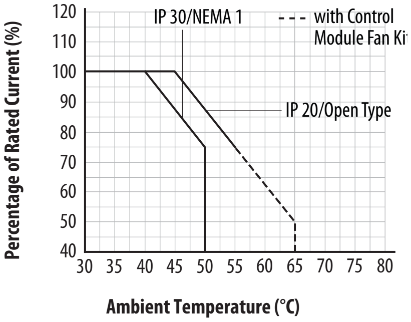
Current Derating Curves

Vertical Mounting

Single Drive

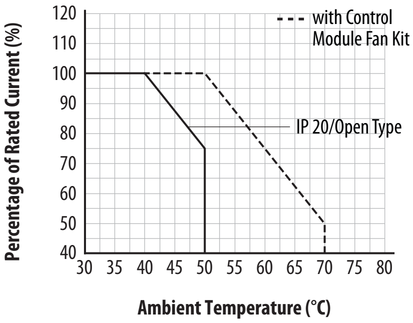


Zero Stacking

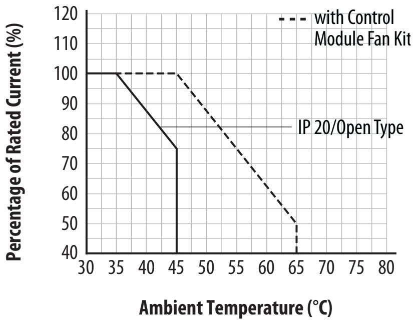


Horizontal/Floor Mounting

Single Drive



Zero Stacking



Derating Guidelines for High Altitude

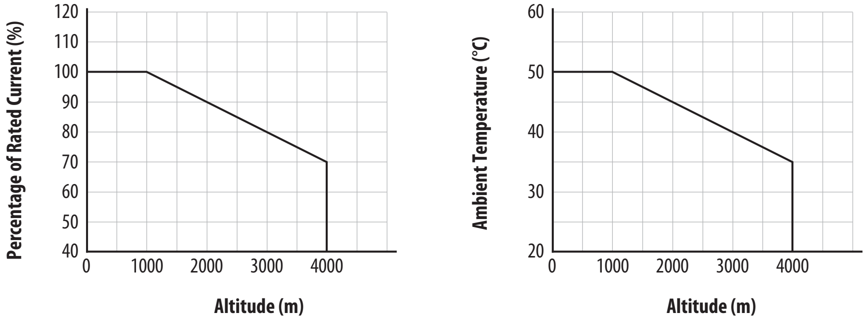
The drive can be used without derating at a maximum altitude of 1000 m (3300 ft). If the drive is used above 1000 m (3300 ft):

- Derate the maximum ambient temperature by 5 °C (41 °F) for every additional 1000 m (3300 ft), subject to limits listed in the Altitude Limit (Based on Voltage) table below.
  Or
- Derate the output current by 10% for every additional 1000 m (3300 ft), up to 3000 m (9900 ft), subject to limits listed in the Altitude Limit (Based on Voltage) table below.

Altitude Limit (Based on Voltage)

Drive Rating	Center Ground (Wye Neutral)	Corner Ground, Impedance Ground, or Ungrounded
100...120V 1-Phase	6000 m	6000 m
200...240V 1-Phase	2000 m	2000 m
200...240V 3-Phase	6000 m	2000 m
380...480V 3-Phase	4000 m	2000 m
525...600V 3-Phase	2000 m	2000 m

High Altitude



Debris Protection

Take precautions to prevent debris from falling through the vents of the drive housing during installation.

Storage

- Store within an ambient temperature range of -40...85°C(1).
- Store within a relative humidity range of 0...95%, noncondensing.
- Do not expose to a corrosive atmosphere.

---

(1) The maximum ambient temperature for storing a Frame E drive is 70 °C.

AC Supply Source Considerations

Ungrounded Distribution Systems

ATTENTION: PowerFlex 520-series drives contain protective MOVs that are referenced to ground. These devices must be disconnected if the drive is installed on an ungrounded or resistive grounded distribution system.

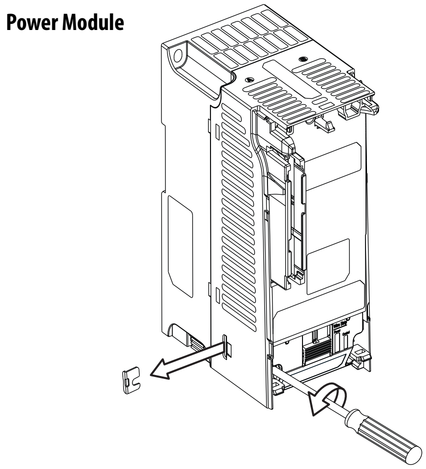
ATTENTION: Removing MOVs in drives with an embedded filter will also disconnect the filter capacitor from earth ground.

Disconnecting MOVs

To prevent drive damage, the MOVs connected to ground shall be disconnected if the drive is installed on an ungrounded distribution system (IT mains) where the line-to-ground voltages on any phase could exceed 125% of the nominal line-to-line voltage. To disconnect these devices, remove the jumper shown in the diagrams below.

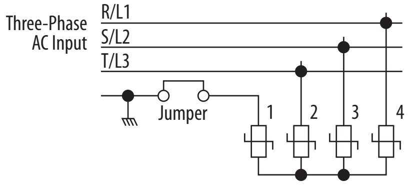
1. Turn the screw counterclockwise to loosen.
2. Pull the jumper completely out of the drive chassis.
3. Tighten the screw to keep it in place.

Jumper Location (Typical)



IMPORTANT Tighten screw after jumper removal.

Phase to Ground MOV Removal



Input Power Conditioning

The drive is suitable for direct connection to input power within the rated voltage of the drive (see page 159). Listed in the Input Power Conditions table below are certain input power conditions which may cause component damage or reduction in product life. If any of these conditions exist, install one of the devices listed under the heading Corrective Action on the line side of the drive.

IMPORTANT	Only one device per branch circuit is required. It should be mounted closest to the branch and sized to handle the total current of the branch circuit.

Input Power Conditions

Input Power Condition	Corrective Action
Low Line Impedance (less than 1% line reactance)	• Install Line Reactor[2] • or Isolation Transformer
Greater than 120 kVA supply transformer	
Line has power factor correction capacitors	• Install Line Reactor[2] • or Isolation Transformer
Line has frequent power interruptions	
Line has intermittent noise spikes in excess of 6000V (lightning)	
Phase to ground voltage exceeds 125% of normal line to line voltage	• Remove MOV jumper to ground. • or Install Isolation Transformer with grounded secondary if necessary.
Ungrounded distribution system	
240V open delta configuration (stinger leg)(1)	• Install Line Reactor[2]

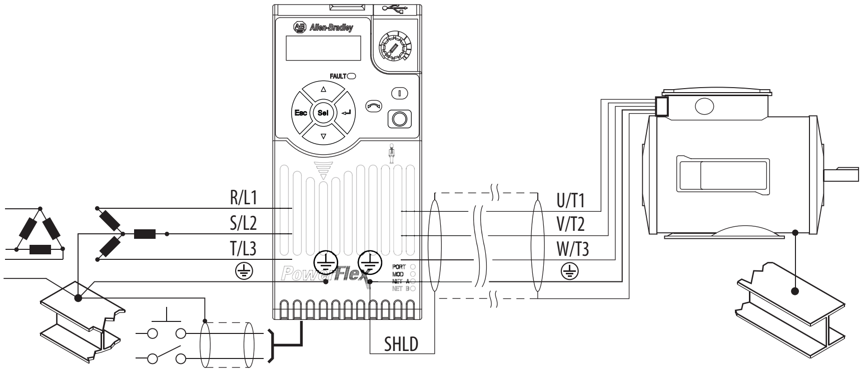
(1) For drives applied on an open delta with a middle phase grounded neutral system, the phase opposite the phase that is tapped in the middle to the neutral or earth is referred to as the "stinger leg," "high leg," "red leg," etc. This leg should be identified throughout the system with red or orange tape on the wire at each connection point. The stinger leg should be connected to the center Phase B on the reactor. See Bulletin 1321-3R Series Line Reactors on page 172 for specific line reactor part numbers.

(2) See Appendix B for accessory ordering information.

General Grounding Requirements

The drive Safety Ground - ⏚ (PE) must be connected to system ground. Ground impedance must conform to the requirements of national and local industrial safety regulations and/or electrical codes. The integrity of all ground connections should be periodically checked.

Typical Grounding



Ground Fault Monitoring

If a system ground fault monitor (RCD) is to be used, only Type B (adjustable) devices should be used to avoid nuisance tripping.

Safety Ground - ⏚ (PE)

This is the safety ground for the drive that is required by code. One of these points must be connected to adjacent building steel (girder, joist), a floor ground rod or bus bar. Grounding points must comply with national and local industrial safety regulations and/or electrical codes.

Motor Ground

The motor ground must be connected to one of the ground terminals on the drive.

Shield Termination - SHLD

Either of the safety ground terminals located on the power terminal block provides a grounding point for the motor cable shield. The **motor cable** shield connected to one of these terminals (drive end) should also be connected to the motor frame (motor end). Use a shield terminating or EMI clamp to connect the shield to the safety ground terminal. The earthing plate or conduit box option may be used with a cable clamp for a grounding point for the cable shield.

When shielded cable is used for **control and signal wiring**, the shield should be grounded at the source end only, not at the drive end.

RFI Filter Grounding

Using a drive with filter may result in relatively high ground leakage currents. Therefore, the **filter must only be used in installations with grounded AC supply systems and be permanently installed and solidly grounded** (bonded) to the building power distribution ground. Ensure that the incoming supply neutral is solidly connected (bonded) to the same building power distribution ground. Grounding must not rely on flexible cables and should not include any form of plug or socket that would permit inadvertent disconnection. Some local codes may require redundant ground connections. The integrity of all connections should be periodically checked.

Fuses and Circuit Breakers

The PowerFlex 520-series drive does not provide branch short circuit protection. This product should be installed with either input fuses or an input circuit breaker. National and local industrial safety regulations and/or electrical codes may determine additional requirements for these installations.

The tables found on pages 23...29 provide recommended AC line input fuse and circuit breaker information. See Fusing and Circuit Breakers below for UL and IEC requirements. Sizes listed are the recommended sizes based on 40 °C (104 °F) and the U.S. N.E.C. Other country, state or local codes may require different ratings.

Fusing

The recommended fuse types are listed in the tables found on pages 23...29. If available current ratings do not match those listed in the tables provided, choose the next higher fuse rating.

- IEC – BS88 (British Standard) Parts 1 & 2(1), EN60269-1, Parts 1 & 2, type GG or equivalent should be used.
- UL – UL Class CC, T, RK1, or J should be used.

Circuit Breakers

The "non-fuse" listings in the tables found on pages 23...29 include inverse time circuit breakers, instantaneous trip circuit breakers (motor circuit protectors) and 140M self-protected combination motor controllers. If one of these is chosen as the desired protection method, the following requirements apply:

- IEC – Both types of circuit breakers and 140M self-protected combination motor controllers are acceptable for IEC installations.
- UL – Only inverse time circuit breakers and the specified 140M self-protected combination motor controllers are acceptable for UL installations.

Bulletin 140M (Self-Protected Combination Controller)/UL489 Circuit Breakers

When using Bulletin 140M or UL489 rated circuit breakers, the guidelines listed below must be followed in order to meet the NEC requirements for branch circuit protection.

- Bulletin 140M can be used in single motor applications.
- Bulletin 140M can be used up stream from the drive **without** the need for fuses.

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(1) Typical designations include, but may not be limited to the following;
Parts 1 & 2: AC, AD, BC, BD, CD, DD, ED, EFS, EF, FF, FG, GF, GG, GH.

Fuses and Circuit Breakers for PowerFlex 523

100…120V 1-Phase Input Protection Devices – Frames A…B

	Output Ratings			Input Ratings				IEC (Non-UL Applications)				UL Applications		
	Heavy Duty							Fuses		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers	
Catalog No.	HP	kW	Amps	kVA	Max Amps[1]	Frame Size	Contactor Catalog No.	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M[2][3][4]
25A-V1P6N104	0.25	0.2	1.6	0.8	6.4	A	100-C09	10	15	140U-D6D2-B80	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D2-B80	140M-C2E-B63
25A-V2P5N104	0.5	0.4	2.5	1.3	9.6	A	100-C12	15	20	140U-D6D2-C12	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-20	140U-D6C2-C12	140M-C2E-C10
25A-V4P8N104	1.0	0.75	4.8	2.5	19.2	B	100-C23	25	40	140U-D6D2-C25	140M-D8E-C20	CLASS RK5, CC, J, or T / DLS-R-40	140U-D6D2-C25	140M-D8E-C20
25A-V6P0N104	1.5	1.1	6.0	3.2	24.0	B	100-C23	30	50	140U-D6D2-C30	140M-F8E-C25	CLASS RK5, CC, J, or T / DLS-R-50	140U-D6D2-C30	140M-F8E-C25

200…240V 1-Phase Input Protection Devices – Frames A…B

	Output Ratings			Input Ratings				IEC (Non-UL Applications)				UL Applications		
	Heavy Duty							Fuses		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers	
Catalog No.	HP	kW	Amps	kVA	Max Amps[1]	Frame Size	Contactor Catalog No.	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M[2][3][4]
25A-A1P6N104	0.25	0.2	1.6	1.4	5.3	A	100-C07	6	10	140U-D6D2-B50	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D2-B50	140M-C2E-B63
25A-A1P6N114	0.25	0.2	1.6	1.4	5.3	A	100-C07	6	10	140U-D6D2-B50	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D2-B50	140M-C2E-B63
25A-A2P5N104	0.5	0.4	2.5	1.7	6.5	A	100-C09	10	15	140U-D6D2-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D2-C10	140M-C2E-C10
25A-A2P5N114	0.5	0.4	2.5	1.7	6.5	A	100-C09	10	15	140U-D6D2-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D2-C10	140M-C2E-C10
25A-A4P8N104	1.0	0.75	4.8	2.8	10.7	A	100-C12	15	25	140U-D6D2-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-25	140U-D6D2-C15	140M-C2E-C16
25A-A4P8N114	1.0	0.75	4.8	2.8	10.7	A	100-C12	15	25	140U-D6D2-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-25	140U-D6D2-C15	140M-C2E-C16
25A-A8P0N104	2.0	1.5	8.0	4.8	18.0	B	100-C23	25	40	140U-D6D2-C25	140M-F8E-C25	CLASS CC, J, or T / 40	140U-D6D2-C25	140M-F8E-C25
25A-A8P0N114	2.0	1.5	8.0	4.8	18.0	B	100-C23	25	40	140U-D6D2-C25	140M-F8E-C25	CLASS CC, J, or T / 40	140U-D6D2-C25	140M-F8E-C25
25A-A011N104	3.0	2.2	11.0	6.0	22.9	B	100-C37	30	50	140U-H6C2-C35	140M-F8E-C25	CLASS CC, J, or T / 50	140U-H6C2-C35	140M-F8E-C25
25A-A011N114	3.0	2.2	11.0	6.0	22.9	B	100-C37	30	50	140U-H6C2-C35	140M-F8E-C25	CLASS CC, J, or T / 50	140U-H6C2-C35	140M-F8E-C25

(1) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive intput current rating.

(2) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See Bulletin 140M Motor Protection Circuit Breakers Application Ratings.

(3) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.

(4) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480Y/277 and 600Y/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

Fuses and Circuit Breakers for PowerFlex 523 *(continued)*

200...240V 3-Phase Input Protection Devices – Frames A...D

	Output Ratings			Input Ratings				IEC (Non-UL Applications)				UL Applications		
	Heavy Duty							Fuses		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers	
Catalog No.	HP	kW	Amps	kVA	Max Amps(1)	Frame Size	Contactor Catalog No.	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M(2)(3)(4)
25A-B1P6N104	0.25	0.2	1.6	0.9	1.9	A	100-C07	3	6	140U-D6D3-B30	140M-C2E-B25	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D3-B30	140M-C2E-B25
25A-B2P5N104	0.5	0.4	2.5	1.2	2.7	A	100-C07	6	6	140U-D6D3-B40	140M-C2E-B40	CLASS RK5, CC, J, or T / DLS-R-6	140U-D6D3-B40	140M-C2E-B40
25A-B5P0N104	1.0	0.75	5.0	2.7	5.8	A	100-C09	10	15	140U-D6D3-B80	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D3-B80	140M-C2E-B63
25A-B8P0N104	2.0	1.5	8.0	4.3	9.5	A	100-C12	15	20	140U-D6D3-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-20	140U-D6D3-C10	140M-C2E-C10
25A-B011N104	3.0	2.2	11.0	6.3	13.8	A	100-C23	20	30	140U-D6D3-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-30	140U-D6D3-C15	140M-C2E-C16
25A-B017N104	5.0	4.0	17.5	9.6	21.1	B	100-C23	30	45	140U-D6D3-C25	140M-F8E-C25	CLASS CC, J, or T / 45	140U-D6D3-C25	140M-F8E-C25
25A-B024N104	7.5	5.5	24.0	12.2	26.6	C	100-C37	35	60	140U-H6C3-C35	140M-F8E-C32	CLASS CC, J, or T / 60	140U-H6C3-C35	140M-F8E-C32
25A-B032N104	10.0	7.5	32.2	15.9	34.8	D	100-C43	45	70	140U-H6C3-C60	140M-F8E-C45	CLASS RK5, CC, J, or T / DLS-R-70	–	140M-F8E-C45

380...480V 3-Phase Input Protection Devices – Frames A...D

	Output Ratings			Input Ratings				IEC (Non-UL Applications)				UL Applications		
	Heavy Duty							Fuses		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers	
Catalog No.	HP	kW	Amps	kVA	Max Amps(1)	Frame Size	Contactor Catalog No.	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M(2)(3)(4)
25A-D1P4N104	0.5	0.4	1.4	1.7	1.9	A	100-C07	3	6	140U-D6D3-B30	140M-C2E-B25	CLASS RK5, CC, J, or T / DLS-R-6	–	140M-C2E-B25
25A-D1P4N114	0.5	0.4	1.4	1.7	1.9	A	100-C07	3	6	140U-D6D3-B30	140M-C2E-B25	CLASS RK5, CC, J, or T / DLS-R-6	–	140M-C2E-B25
25A-D2P3N104	1.0	0.75	2.3	2.9	3.2	A	100-C07	6	10	140U-D6D3-B60	140M-C2E-B40	CLASS RK5, CC, J, or T / DLS-R-10	–	140M-C2E-B40
25A-D2P3N114	1.0	0.75	2.3	2.9	3.2	A	100-C07	6	10	140U-D6D3-B60	140M-C2E-B40	CLASS RK5, CC, J, or T / DLS-R-10	–	140M-C2E-B40
25A-D4P0N104	2.0	1.5	4.0	5.2	5.7	A	100-C09	10	15	140U-D6D3-B60	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-C2E-B63
25A-D4P0N114	2.0	1.5	4.0	5.2	5.7	A	100-C09	10	15	140U-D6D3-B60	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-C2E-B63
25A-D6P0N104	3.0	2.2	6.0	6.9	7.5	A	100-C09	10	15	140U-D6D3-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-C2E-C10
25A-D6P0N114	3.0	2.2	6.0	6.9	7.5	A	100-C09	10	15	140U-D6D3-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-C2E-C10
25A-D010N104	5.0	4.0	10.5	12.6	13.8	B	100-C23	20	30	140U-D6D3-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-30	–	140M-C2E-C16
25A-D010N114	5.0	4.0	10.5	12.6	13.8	B	100-C23	20	30	140U-D6D3-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-30	–	140M-C2E-C16
25A-D013N104	7.5	5.5	13.0	14.1	15.4	C	100-C23	20	35	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 35	–	140M-D8E-C20
25A-D013N114	7.5	5.5	13.0	14.1	15.4	C	100-C23	20	35	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 35	–	140M-D8E-C20
25A-D017N104	10.0	7.5	17.0	16.8	18.4	C	100-C23	25	40	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 40	–	140M-D8E-C20
25A-D017N114	10.0	7.5	17.0	16.8	18.4	C	100-C23	25	40	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 40	–	140M-D8E-C20
25A-D024N104	15.0	11.0	24.0	24.1	26.4	D	100-C37	35	60	140U-H6C3-C40	140M-F8E-C32	CLASS CC, J, or T / 60	–	–
25A-D024N114	15.0	11.0	24.0	24.1	26.4	D	100-C37	35	60	140U-H6C3-C40	140M-F8E-C32	CLASS CC, J, or T / 60	–	–

(1) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive intput current rating.

(2) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See Bulletin 140M Motor Protection Circuit Breakers Application Ratings.

(3) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.

(4) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480Y/277 and 600Y/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

Fuses and Circuit Breakers for PowerFlex 523 *(continued)*

525...600V 3-Phase Input Protection Devices – Frames A...D

	Output Ratings		Input Ratings					IEC (Non-UL Applications)				UL Applications		
	Heavy Duty							Fuses		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers	
Catalog No.	HP	kW	Amps	kVA	Max Amps[1]	Frame Size	Contactor Catalog No.	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M[2][3][4]
25A-E0P9N104	0.5	0.4	0.9	1.4	1.2	A	100-C09	3	6	140U-D6D3-B20	140M-C2E-B25	CLASS RK5, CC, J, or T / DLS-R-6	–	140M-C2E-B25
25A-E1P7N104	1.0	0.75	1.7	2.6	2.3	A	100-C09	3	6	140U-D6D3-B30	140M-C2E-B25	CLASS RK5, CC, J, or T / DLS-R-6	–	140M-C2E-B25
25A-E3P0N104	2.0	1.5	3.0	4.3	3.8	A	100-C09	6	10	140U-D6D3-B50	140M-C2E-B40	CLASS RK5, CC, J, or T / DLS-R-10	–	140M-C2E-B40
25A-E4P2N104	3.0	2.2	4.2	6.1	5.3	A	100-C09	10	15	140U-D6D3-B80	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-D8E-B63
25A-E6P6N104	5.0	4.0	6.6	9.1	8.0	B	100-C09	10	20	140U-D6D3-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-20	–	140M-D8E-C10
25A-E9P9N104	7.5	5.5	9.9	12.8	11.2	C	100-C16	15	25	140U-D6D3-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-25	–	140M-D8E-C16[5]
25A-E012N104	10.0	7.5	12.0	15.4	13.5	C	100-C23	20	30	140U-D6D3-C20	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-30	–	140M-D8E-C16
25A-E019N104	15.0	11.0	19.0	27.4	24.0	D	100-C30	30	50	140U-H6C3-C30	140M-F8E-C25	CLASS CC, J, or T / 50	–	–

(1) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive intput current rating.

(2) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See Bulletin 140M Motor Protection Circuit Breakers Application Ratings.

(3) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.

(4) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480Y/277 and 600Y/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

(5) When used with the 140M circuit breaker, the 25B-E9P9104 must be installed in a ventilated or non-ventilated enclosure with the minimum size of 457.2 x 457.2 x 269.8 mm (18 x 18 x 10.62 in.).

Fuses and Circuit Breakers for PowerFlex 525

100…120V 1-Phase Input Protection Devices – Frames A…B

	Output Ratings					Input Ratings				IEC (Non-UL Applications)				UL Applications		
	Normal Duty		Heavy Duty							Fuses		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers	
Catalog No.	HP	kW	HP	kW	Amps	kVA	Max Amps(1)	Frame Size	Contactor Catalog No.	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M(2)(3)(4)
25B-V2P5N104	0.5	0.4	0.5	0.4	2.5	1.3	9.6	A	100-C12	15	20	140U-D6D2-C12	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-20	140U-D6C2-C12	140M-C2E-C10
25B-V4P8N104	1.0	0.75	1.0	0.75	4.8	2.5	19.2	B	100-C23	25	40	140U-D6D2-C25	140M-D8E-C20	CLASS RK5, CC, J, or T / DLS-R-40	140U-D6D2-C25	140M-D8E-C20
25B-V6P0N104	1.5	1.1	1.5	1.1	6.0	3.2	24.0	B	100-C23	30	50	140U-D6D2-C30	140M-F8E-C25	CLASS RK5, CC, J, or T / DLS-R-50	140U-D6D2-C30	140M-F8E-C25

200…240V 1-Phase Input Protection Devices – Frames A…B

	Output Ratings					Input Ratings				IEC (Non-UL Applications)				UL Applications		
	Normal Duty		Heavy Duty							Fuses		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers	
Catalog No.	HP	kW	HP	kW	Amps	kVA	Max Amps(1)	Frame Size	Contactor Catalog No.	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M(2)(3)(4)
25B-A2P5N104	0.5	0.4	0.5	0.4	2.5	1.7	6.5	A	100-C09	10	15	140U-D6D2-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D2-C10	140M-C2E-C10
25B-A2P5N114	0.5	0.4	0.5	0.4	2.5	1.7	6.5	A	100-C09	10	15	140U-D6D2-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D2-C10	140M-C2E-C10
25B-A4P8N104	1.0	0.75	1.0	0.75	4.8	2.8	10.7	A	100-C12	15	25	140U-D6D2-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-25	140U-D6D2-C15	140M-C2E-C16
25B-A4P8N114	1.0	0.75	1.0	0.75	4.8	2.8	10.7	A	100-C12	15	25	140U-D6D2-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-25	140U-D6D2-C15	140M-C2E-C16
25B-A8P0N104	2.0	1.5	2.0	1.5	8.0	4.8	18.0	B	100-C23	25	40	140U-D6D2-C25	140M-F8E-C25	CLASS CC, J, or T / 40	140U-D6D2-C25	140M-F8E-C25
25B-A8P0N114	2.0	1.5	2.0	1.5	8.0	4.8	18.0	B	100-C23	25	40	140U-D6D2-C25	140M-F8E-C25	CLASS CC, J, or T / 40	140U-D6D2-C25	140M-F8E-C25
25B-A011N104	3.0	2.2	3.0	2.2	11.0	6.0	22.9	B	100-C37	30	50	140U-H6C2-C35	140M-F8E-C25	CLASS CC, J, or T / 50	140U-H6C2-C35	140M-F8E-C25
25B-A011N114	3.0	2.2	3.0	2.2	11.0	6.0	22.9	B	100-C37	30	50	140U-H6C2-C35	140M-F8E-C25	CLASS CC, J, or T / 50	140U-H6C2-C35	140M-F8E-C25

(1) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive intput current rating.

(2) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See Bulletin 140M Motor Protection Circuit Breakers Application Ratings.

(3) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.

(4) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480Y/277 and 600Y/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

Fuses and Circuit Breakers for PowerFlex 525 *(continued)*

200...240V 3-Phase Input Protection Devices – Frames A...E

	Output Ratings				Input Ratings					IEC (Non-UL Applications)				UL Applications		
	Normal Duty		Heavy Duty							Fuses		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers	
Catalog No.[1]	HP	kW	HP	kW	Amps	kVA	Max Amps[2]	Frame Size	Contactor Catalog No.	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M[3][4][5]
25B-B2P5N104	0.5	0.4	0.5	0.4	2.5	1.2	2.7	A	100-C07	6	6	140U-D6D3-B40	140M-C2E-B40	CLASS RK5, CC, J, or T / DLS-R-6	140U-D6D3-B40	140M-C2E-B40
25B-B5P0N104	1.0	0.75	1.0	0.75	5.0	2.7	5.8	A	100-C09	10	15	140U-D6D3-B80	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	140U-D6D3-B80	140M-C2E-B63
25B-B8P0N104	2.0	1.5	2.0	1.5	8.0	4.3	9.5	A	100-C12	15	20	140U-D6D3-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-20	140U-D6D3-C10	140M-C2E-C10
25B-B011N104	3.0	2.2	3.0	2.2	11.0	6.3	13.8	A	100-C23	20	30	140U-D6D3-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-30	140U-D6D3-C15	140M-C2E-C16
25B-B017N104	5.0	4.0	5.0	4.0	17.5	9.6	21.1	B	100-C23	30	45	140U-D6D3-C25	140M-F8E-C25	CLASS CC, J, or T / 45	140U-D6D3-C25	140M-F8E-C25
25B-B024N104	7.5	5.5	7.5	5.5	24.0	12.2	26.6	C	100-C37	35	60	140U-H6C3-C35	140M-F8E-C32	CLASS CC, J, or T / 60	140U-H6C3-C35	140M-F8E-C32
25B-B032N104	10.0	7.5	10.0	7.5	32.2	15.9	34.8	D	100-C43	45	70	140U-H6C3-C60	140M-F8E-C45	CLASS RK5, CC, J, or T / DLS-R-70	–	140M-F8E-C45
25B-B048N104	15.0	11.0	15.0	11.0	48.3	20.1	44.0	E	100-C60	60	90	140U-H6C3-C70	140M-F8E-C45	CLASS CC, J, or T / 90	–	–
25B-B062N104	20.0	15.0	15.0	11.0	62.1	25.6	56.0	E	100-C72	70	125	140U-H6C3-C90	140M-H8P-C70	CLASS CC, J, or T / 125	–	–

(1) ▨ Normal and Heavy duty ratings are available for drives above 15 HP / 11 kW.

(2) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive intput current rating.

(3) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See Bulletin 140M Motor Protection Circuit Breakers Application Ratings.

(4) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.

(5) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480Y/277 and 600Y/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

Fuses and Circuit Breakers for PowerFlex 525 *(continued)*

380...480V 3-Phase Input Protection Devices – Frames A...E

	Output Ratings					Input Ratings				IEC (Non-UL Applications)				UL Applications		
	Normal Duty		Heavy Duty							Fuses		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers	
Catalog No.[1]	HP	kW	HP	kW	Amps	kVA	Max Amps[2]	Frame Size	Contactor Catalog No.	Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M[3][4][5]
25B-D1P4N104	0.5	0.4	0.5	0.4	1.4	1.7	1.9	A	100-C07	3	6	140U-D6D3-B30	140M-C2E-B25	CLASS RK5, CC, J, or T / DLS-R-6	–	140M-C2E-B25
25B-D1P4N114	0.5	0.4	0.5	0.4	1.4	1.7	1.9	A	100-C07	3	6	140U-D6D3-B30	140M-C2E-B25	CLASS RK5, CC, J, or T / DLS-R-6	–	140M-C2E-B25
25B-D2P3N104	1.0	0.75	1.0	0.75	2.3	2.9	3.2	A	100-C07	6	10	140U-D6D3-B60	140M-C2E-B40	CLASS RK5, CC, J, or T / DLS-R-10	–	140M-C2E-B40
25B-D2P3N114	1.0	0.75	1.0	0.75	2.3	2.9	3.2	A	100-C07	6	10	140U-D6D3-B60	140M-C2E-B40	CLASS RK5, CC, J, or T / DLS-R-10	–	140M-C2E-B40
25B-D4P0N104	2.0	1.5	2.0	1.5	4.0	5.2	5.7	A	100-C09	10	15	140U-D6D3-B60	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-C2E-B63
25B-D4P0N114	2.0	1.5	2.0	1.5	4.0	5.2	5.7	A	100-C09	10	15	140U-D6D3-B60	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-C2E-B63
25B-D6P0N104	3.0	2.2	3.0	2.2	6.0	6.9	7.5	A	100-C09	10	15	140U-D6D3-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-C2E-C10
25B-D6P0N114	3.0	2.2	3.0	2.2	6.0	6.9	7.5	A	100-C09	10	15	140U-D6D3-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-C2E-C10
25B-D010N104	5.0	4.0	5.0	4.0	10.5	12.6	13.8	B	100-C23	20	30	140U-D6D3-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-30	–	140M-C2E-C16
25B-D010N114	5.0	4.0	5.0	4.0	10.5	12.6	13.8	B	100-C23	20	30	140U-D6D3-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-30	–	140M-C2E-C16
25B-D013N104	7.5	5.5	7.5	5.5	13.0	14.1	15.4	C	100-C23	20	35	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 35	–	140M-D8E-C20
25B-D013N114	7.5	5.5	7.5	5.5	13.0	14.1	15.4	C	100-C23	20	35	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 35	–	140M-D8E-C20
25B-D017N104	10.0	7.5	10.0	7.5	17.0	16.8	18.4	C	100-C23	25	40	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 40	–	140M-D8E-C20
25B-D017N114	10.0	7.5	10.0	7.5	17.0	16.8	18.4	C	100-C23	25	40	140U-D6D3-C25	140M-D8E-C20	CLASS CC, J, or T / 40	–	140M-D8E-C20
25B-D024N104	15.0	11.0	15.0	11.0	24.0	24.1	26.4	D	100-C37	35	60	140U-H6C3-C40	140M-F8E-C32	CLASS CC, J, or T / 60	–	–
25B-D024N114	15.0	11.0	15.0	11.0	24.0	24.1	26.4	D	100-C37	35	60	140U-H6C3-C40	140M-F8E-C32	CLASS CC, J, or T / 60	–	–
25B-D030N104	20.0	15.0	15.0	11.0	30.0	30.2	33.0	D	100-C43	45	70	140U-H6C3-C50	140M-F8E-C45	CLASS CC, J, or T / 70	–	–
25B-D030N114	20.0	15.0	15.0	11.0	30.0	30.2	33.0	D	100-C43	45	70	140U-H6C3-C50	140M-F8E-C45	CLASS CC, J, or T / 70	–	–
25B-D037N114	25.0	18.5	20.0	15.0	37.0	30.8	33.7	E	100-C43	45	70	140U-H6C3-C50	140M-F8E-C45	CLASS CC, J, or T / 70	–	140M-F8E-C45
25B-D043N114	30.0	22.0	25.0	18.5	43.0	35.6	38.9	E	100-C60	50	80	140U-H6C3-C60	140M-F8E-C45	CLASS CC, J, or T / 80	–	140M-F8E-C45

(1) ▨ Normal and Heavy duty ratings are available for drives above 15 HP / 11 kW.

(2) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive intput current rating.

(3) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See Bulletin 140M Motor Protection Circuit Breakers Application Ratings.

(4) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.

(5) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480Y/277 and 600Y/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

Fuses and Circuit Breakers for PowerFlex 525 *(continued)*

525...600V 3-Phase Input Protection Devices – Frames A...E

	Output Ratings					Input Ratings				IEC (Non-UL Applications)				UL Applications		
	Normal Duty		Heavy Duty					Frame Size	Contactor Catalog No.	Fuses		Circuit Breakers		Fuses (Max. Rating)	Circuit Breakers	
Catalog No.[1]	HP	kW	HP	kW	Amps	kVA	Max Amps[2]			Min. Rating	Max. Rating	140U	140M	Class / Catalog No.	140U	140M[3][4][5]
25B-E0P9N104	0.5	0.4	0.5	0.4	0.9	1.4	1.2	A	100-C09	3	6	140U-D6D3-B20	140M-C2E-B25	CLASS RK5, CC, J, or T / DLS-R-6	–	140M-C2E-B25
25B-E1P7N104	1.0	0.75	1.0	0.75	1.7	2.6	2.3	A	100-C09	3	6	140U-D6D3-B30	140M-C2E-B25	CLASS RK5, CC, J, or T / DLS-R-6	–	140M-C2E-B25
25B-E3P0N104	2.0	1.5	2.0	1.5	3.0	4.3	3.8	A	100-C09	6	10	140U-D6D3-B50	140M-C2E-B40	CLASS RK5, CC, J, or T / DLS-R-10	–	140M-C2E-B40
25B-E4P2N104	3.0	2.2	3.0	2.2	4.2	6.1	5.3	A	100-C09	10	15	140U-D6D3-B80	140M-C2E-B63	CLASS RK5, CC, J, or T / DLS-R-15	–	140M-D8E-B63
25B-E6P6N104	5.0	4.0	5.0	4.0	6.6	9.1	8.0	B	100-C09	10	20	140U-D6D3-C10	140M-C2E-C10	CLASS RK5, CC, J, or T / DLS-R-20	–	140M-D8E-C10
25B-E9P9N104	7.5	5.5	7.5	5.5	9.9	12.8	11.2	C	100-C16	15	25	140U-D6D3-C15	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-25	–	140M-D8E-C16[6]
25B-E012N104	10.0	7.5	10.0	7.5	12.0	15.4	13.5	C	100-C23	20	30	140U-D6D3-C20	140M-C2E-C16	CLASS RK5, CC, J, or T / DLS-R-30	–	140M-D8E-C16
25B-E019N104	15.0	11.0	15.0	11.0	19.0	27.4	24.0	D	100-C30	30	50	140U-H6C3-C30	140M-F8E-C25	CLASS CC, J, or T / 50	–	–
25B-E022N104	20.0	15.0	15.0	11.0	22.0	31.2	27.3	D	100-C30	35	60	140U-H6C3-C35	140M-F8E-C32	CLASS CC, J, or T / 60	–	–
25B-E027N104	25.0	18.5	20.0	15.0	27.0	28.2	24.7	E	100-C30	35	50	140U-H6C3-C35	140M-F8E-C32	CLASS CC, J, or T / 50	–	–
25B-E032N104	30.0	22.0	25.0	18.5	32.0	33.4	29.2	E	100-C37	40	60	140U-H6C3-C50	140M-F8E-C32	CLASS CC, J, or T / 60	–	–

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(1) ▨ Normal and Heavy duty ratings are available for drives above 15 HP / 11 kW.

(2) When the drive is controlling motors with lower amp ratings, refer to the drive nameplate for drive intput current rating.

(3) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See Bulletin 140M Motor Protection Circuit Breakers Application Ratings.

(4) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.

(5) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 480Y/277 and 600Y/347 AC input. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.

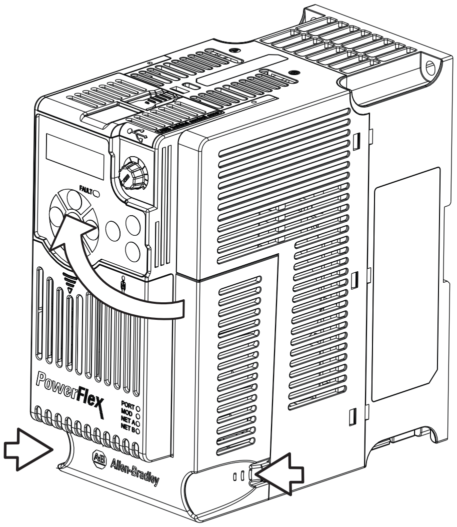
(6) When used with the 140M circuit breaker, the 25B-E9P9104 must be installed in a ventilated or non-ventilated enclosure with the minimum size of 457.2 x 457.2 x 269.8 mm (18 x 18 x 10.62 in.).

Power and Control Module

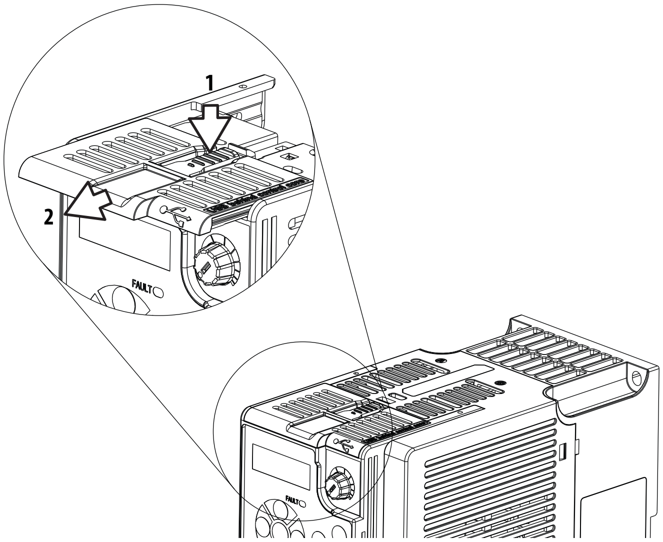
PowerFlex 520-series drives consist of a Power Module and Control Module.

Separating the Power and Control Module

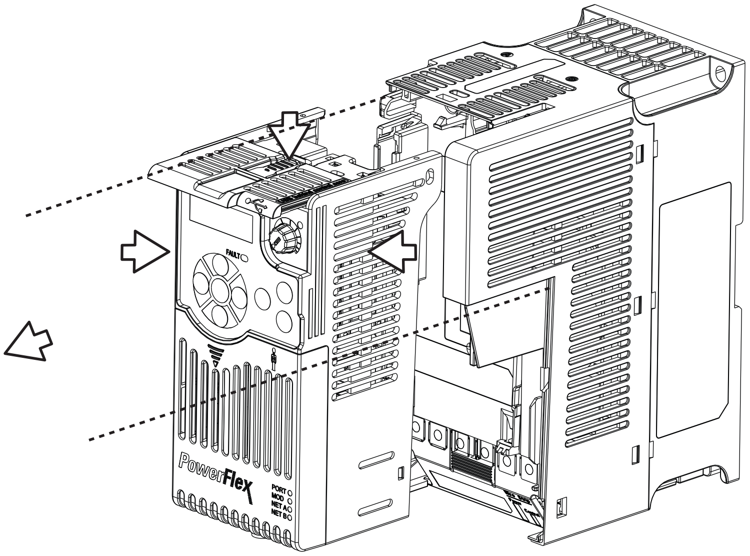
1. Press and hold down the catch on both sides of the frame cover, then pull out and swing upwards to remove (Frames B…E only).


FAULT
PowerFlex
PORT
MOD
NET A
NET B
Allen-Bradley

2. Press down and slide out the top cover of the Control Module to unlock it from the Power Module.



3. Hold the sides and top of the Control Module firmly, then pull out to separate it from the Power Module.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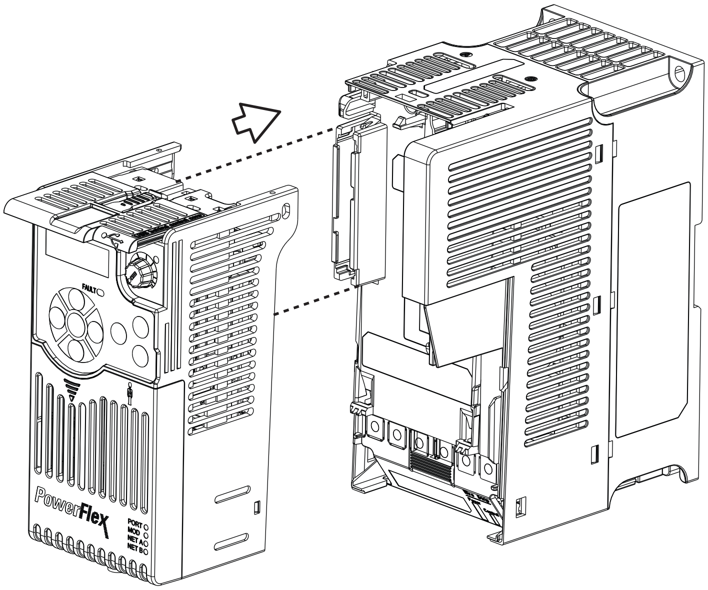
Connecting the Power and Control Module

1. Align the connectors on the Power Module and Control Module, then push the Control Module firmly onto the Power Module.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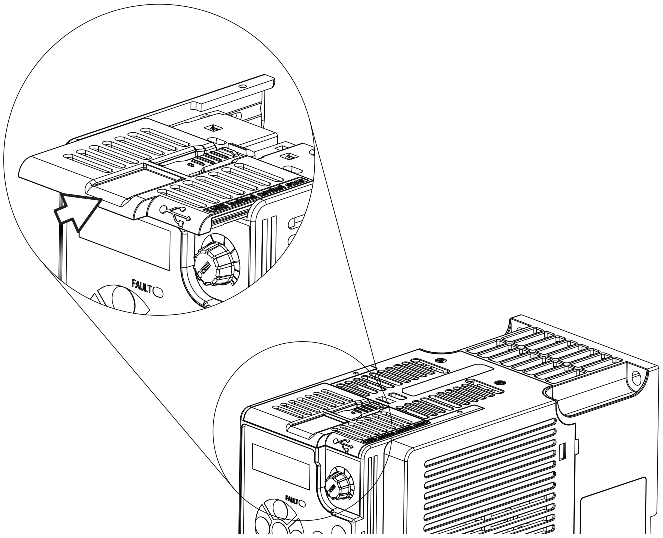
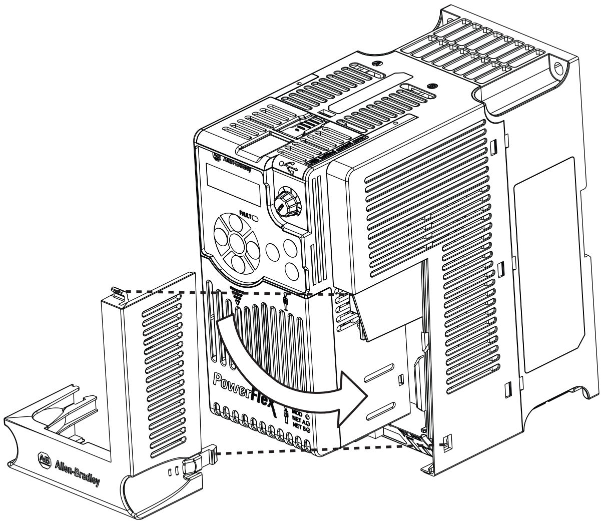
PowerFlex
PORT
MOD
NET A
NET B

2. Push the top cover of the Control Module towards the Power Module to lock it.



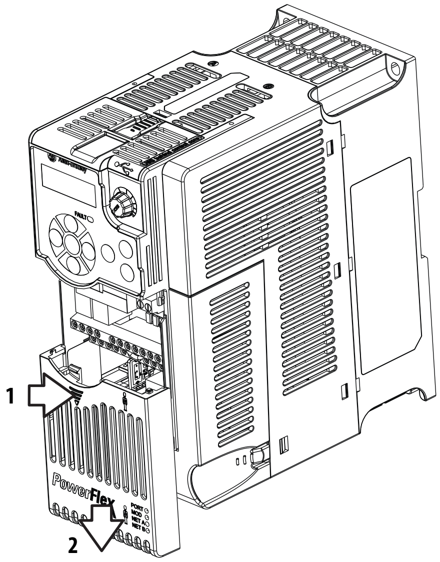
3. Insert the catch at the top of the frame cover into the Power Module, then swing the frame cover to snap the side catches onto the Power Module (Frames B…E only).


PowerFlex
Allen-Bradley
FAULT

Control Module Cover

To access the control terminals, DSI port, and Ethernet port, the front cover must be removed. To remove:

1. Press and hold down the arrow on the front of the cover.
2. Slide the front cover down to remove from the Control Module.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PowerFlex
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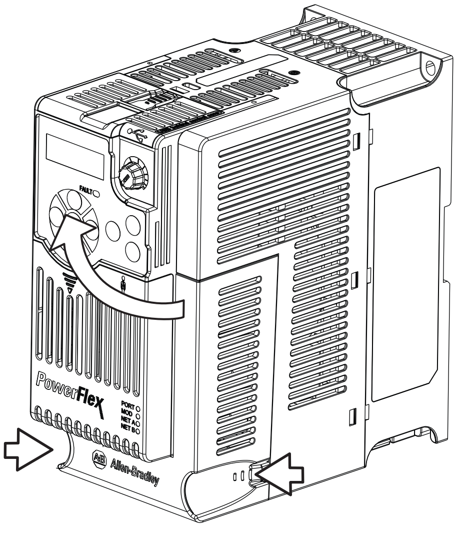
NET A
NET B

Re-attach the front cover when wiring is complete.

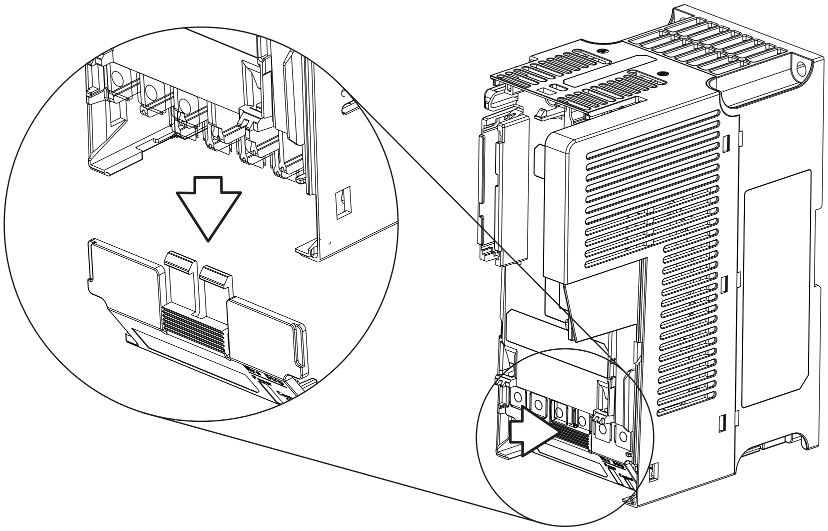
Power Module Terminal Guard

To access the power terminals, the terminal guard must be removed. To remove:

1. Press and hold down the catch on both sides of the frame cover, then pull out and swing upwards to remove (Frames B…E only).


FAULT
PowerFlex
PORT
MOD
NET A
NET B
Allen-Bradley

2. Press and hold down the locking tab on the terminal guard.
3. Slide the terminal guard down to remove from the Power Module.



Re-attach the terminal guard when wiring is complete.

To access the power terminals for Frame A, you need to separate the Power and Control Modules. See Separating the Power and Control Module on page 30 for instructions.

Power Wiring

ATTENTION: National Codes and standards (NEC, VDE, BSI, etc.) and local codes outline provisions for safely installing electrical equipment. Installation must comply with specifications regarding wire types, conductor sizes, branch circuit protection and disconnect devices. Failure to do so may result in personal injury and/or equipment damage.

ATTENTION: To avoid a possible shock hazard caused by induced voltages, unused wires in the conduit must be grounded at both ends. For the same reason, if a drive sharing a conduit is being serviced or installed, all drives using this conduit should be disabled. This will help minimize the possible shock hazard from "cross coupled" power leads.

Motor Cable Types Acceptable for 100…600 Volt Installations

A variety of cable types are acceptable for drive installations. For many installations, unshielded cable is adequate, provided it can be separated from sensitive circuits. As an approximate guide, allow a spacing of 0.3 m (1 ft) for every 10 m (32.8 ft) of length. In all cases, long parallel runs must be avoided. Do not use cable with an insulation thickness less than 15 mils (0.4 mm/0.015 in.). Do not route more than three sets of motor leads in a single conduit to minimize "cross talk". If more than three drive/motor connections per conduit are required, shielded cable must be used.

UL installations above 50 °C ambient must use 600V, 90 °C wire.
UL installations in 50 °C ambient must use 600V, 75 °C or 90 °C wire.
UL installations in 40 °C ambient should use 600V, 75 °C or 90 °C wire.
Use copper wire only. Wire gauge requirements and recommendations are based on 75 °C. Do not reduce wire gauge when using higher temperature wire.

Unshielded

THHN, THWN or similar wire is acceptable for drive installation in dry environments provided adequate free air space and/or conduit fill rates limits are provided. Any wire chosen must have a minimum insulation thickness of 15 mils and should not have large variations in insulation concentricity.

ATTENTION: Do not use THHN or similarly coated wire in wet areas.

Shielded/Armored Cable

Shielded cable contains all of the general benefits of multi-conductor cable with the added benefit of a copper braided shield that can contain much of the noise generated by a typical AC Drive. Strong consideration for shielded cable should be given in installations with sensitive equipment such as weigh scales, capacitive proximity switches and other devices that may be affected by electrical noise in the distribution system. Applications with large numbers of drives in a similar location, imposed EMC regulations or a high degree of communications / networking are also good candidates for shielded cable.

Shielded cable may also help reduce shaft voltage and induced bearing currents for some applications. In addition, the increased impedance of shielded cable may help extend the distance that the motor can be located from the drive without the addition of motor protective devices such as terminator networks. Refer to Reflected Wave in "Wiring and Grounding Guide, (PWM) AC Drives," publication DRIVES-IN001.

Consideration should be given to all of the general specifications dictated by the environment of the installation, including temperature, flexibility, moisture characteristics and chemical resistance. In addition, a braided shield should be included and be specified by the cable manufacturer as having coverage of at least 75%. An additional foil shield can greatly improve noise containment.

A good example of recommended cable is Belden® 295xx (xx determines gauge). This cable has four (4) XLPE insulated conductors with a 100% coverage foil and an 85% coverage copper braided shield (with drain wire) surrounded by a PVC jacket.

Other types of shielded cable are available, but the selection of these types may limit the allowable cable length. Particularly, some of the newer cables twist 4 conductors of THHN wire and wrap them tightly with a foil shield. This construction can greatly increase the cable charging current required and reduce the overall drive performance. Unless specified in the individual distance tables as tested with the drive, these cables are not recommended and their performance against the lead length limits supplied is not known.

Recommended Shielded Wire

Location	Rating/Type	Description
Standard (Option 1)	600V, 90 °C (194 °F) XHHW2/RHW-2 Anixter B209500-B209507, Belden 29501-29507, or equivalent	• Four tinned copper conductors with XLPE insulation. • Copper braid/aluminum foil combination shield and tinned copper drain wire. • PVC jacket.
Standard (Option 2)	Tray rated 600V, 90 °C (194 °F) RHH/RHW-2 Anixter OLF-7xxxxx or equivalent	• Three tinned copper conductors with XLPE insulation. • 5 mil single helical copper tape (25% overlap min.) with three bare copper grounds in contact with shield. • PVC jacket.
Class I & II; Division I & II	Tray rated 600V, 90 °C (194 °F) RHH/RHW-2 Anixter 7V-7xxxx-3G or equivalent	• Three bare copper conductors with XLPE insulation and impervious corrugated continuously welded aluminum armor. • Black sunlight resistant PVC jacket overall. • Three copper grounds on #10 AWG and smaller.

Reflected Wave Protection

The drive should be installed as close to the motor as possible. Installations with long motor cables may require the addition of external devices to limit voltage reflections at the motor (reflected wave phenomena). Refer to Reflected Wave in "Wiring and Grounding Guide, (PWM) AC Drives," publication DRIVES-IN001.

The reflected wave data applies to all carrier frequencies 2…16 kHz.

For 240V ratings and lower, reflected wave effects do not need to be considered.

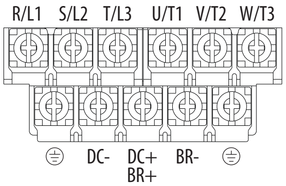
Output Disconnect

The drive is intended to be commanded by control input signals that will start and stop the motor. A device that routinely disconnects then reapplies output power to the motor for the purpose of starting and stopping the motor should not be used. If it is necessary to disconnect power to the motor with the drive outputting power, an auxiliary contact should be used to simultaneously disable drive (Aux Fault or Coast to Stop).

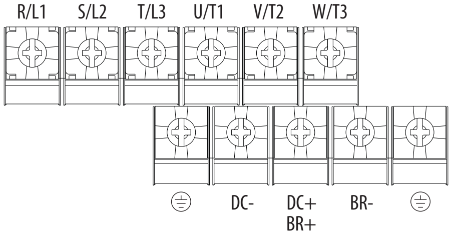
Power Terminal Block

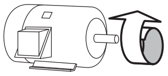
Power Terminal Block

Frame A, B, C & D



Frame E



Terminal	Description
R/L1, S/L2	1-Phase Input Line Voltage Connection
R/L1, S/L2, T/L3	3-Phase Input Line Voltage Connection
U/T1, V/T2, W/T3	Motor Phase Connection =  Switch any two motor leads to change forward direction.
DC+, DC-	DC Bus Connection
BR+, BR-	Dynamic Brake Resistor Connection
⏚	Safety Ground - PE

IMPORTANT Terminal screws may become loose during shipment. Ensure that all terminal screws are tightened to the recommended torque before applying power to the drive.

Power Terminal Block Wire Specifications

Frame	Maximum Wire Size[1]	Minimum Wire Size[1]	Torque
A	5.3 mm^2 (10 AWG)	0.8 mm^2 (18 AWG)	1.76...2.16 Nm (15.6...19.1 lb-in.)
B	8.4 mm^2 (8 AWG)	2.1 mm^2 (14 AWG)	1.76...2.16 Nm (15.6...19.1 lb-in.)
C	8.4 mm^2 (8 AWG)	2.1 mm^2 (14 AWG)	1.76...2.16 Nm (15.6...19.1 lb-in.)
D	13.3 mm^2 (6 AWG)	5.3 mm^2 (10 AWG)	1.76...2.16 Nm (15.6...19.1 lb-in.)
E	26.7 mm^2 (3 AWG)	8.4 mm^2 (8 AWG)	3.09...3.77 Nm (27.3...33.4 lb-in.)

(1) Maximum/minimum sizes that the terminal block will accept – these are not recommendations.

Common Bus/Precharge Notes

If drives are used with a disconnect switch to the common DC bus, then an auxiliary contact on the disconnect must be connected to a digital input of the drive. The corresponding input (parameter t062, t063, t065...t068 [DigIn TermBlk xx]) must be set to 30, "Precharge En" This provides the proper precharge interlock, guarding against possible damage to the drive when connected to a common DC bus.

I/O Wiring

Motor Start/Stop Precautions

ATTENTION: A contactor or other device that routinely disconnects and reapplies the AC line to the drive to start and stop the motor can cause drive hardware damage. The drive is designed to use control input signals that will start and stop the motor. If used, the input device must not exceed one operation per minute or drive damage can occur.

ATTENTION: The drive start/stop control circuitry includes solid-state components. If hazards due to accidental contact with moving machinery or unintentional flow of liquid, gas or solids exist, an additional hardwired stop circuit may be required to remove the AC line to the drive. When the AC line is removed, there will be a loss of any inherent regenerative braking effect that might be present - the motor will coast to a stop. An auxiliary braking method may be required. Alternatively, use the drive's safety input function.

Important points to remember about I/O wiring:

- Always use copper wire.
- Wire with an insulation rating of 600V or greater is recommended.
- Control and signal wires should be separated from power wires by at least 0.3 m (1 ft).

IMPORTANT I/O terminals labeled "Common" are not referenced to the safety ground (PE) terminal and are designed to greatly reduce common mode interference.

ATTENTION: Driving the 4-20 mA analog input from a voltage source could cause component damage. Verify proper configuration prior to applying input signals.

Signal and Control Wire Types

Recommendations are for 50 °C ambient temperature.
75 °C wire must be used for 60 °C ambient temperature.
90 °C wire must be used for 70 °C ambient temperature.

Recommended Signal Wire

Signal Type/ Where Used	Belden Wire Type(s)[1] *(or equivalent)*	Description	Min. Insulation Rating
Analog I/O & PTC	8760/9460	0.750 mm^2 (18 AWG), twisted pair, 100% shield with drain[2]	300V, 60 °C (140 °F)
Remote Pot	8770	0.750 mm^2 (18 AWG), 3 conductor, shielded	
Encoder/Pulse I/O	9728/9730	0.196 mm^2 (24 AWG), individually shielded pairs	

(1) Stranded or solid wire.

(2) If the wires are short and contained within a cabinet which has no sensitive circuits, the use of shielded wire may not be necessary, but is always recommended.

Recommended Control Wire for Digital I/O

Type	Wire Type(s)	Description	Min. Insulation Rating
Unshielded	Per US NEC or applicable national or local code	–	300V, 60 °C (140 °F)
Shielded	Multi-conductor shielded cable such as Belden 8770 (or equivalent)	0.750 mm^2 (18 AWG), 3 conductor, shielded.	

Maximum Control Wire Recommendations

Do not exceed control wiring length of 30 m (100 ft). Control signal cable length is highly dependent on electrical environment and installation practices. To improve noise immunity, the I/O terminal block Common may be connected to ground terminal/protective earth. If using the RS485 (DSI) port, I/O Terminal C1 should also be connected to ground terminal/protective earth. Additionally, communication noise immunity can also be improved by connecting I/O Terminal C2 to ground terminal/protective earth.

Control I/O Terminal Block

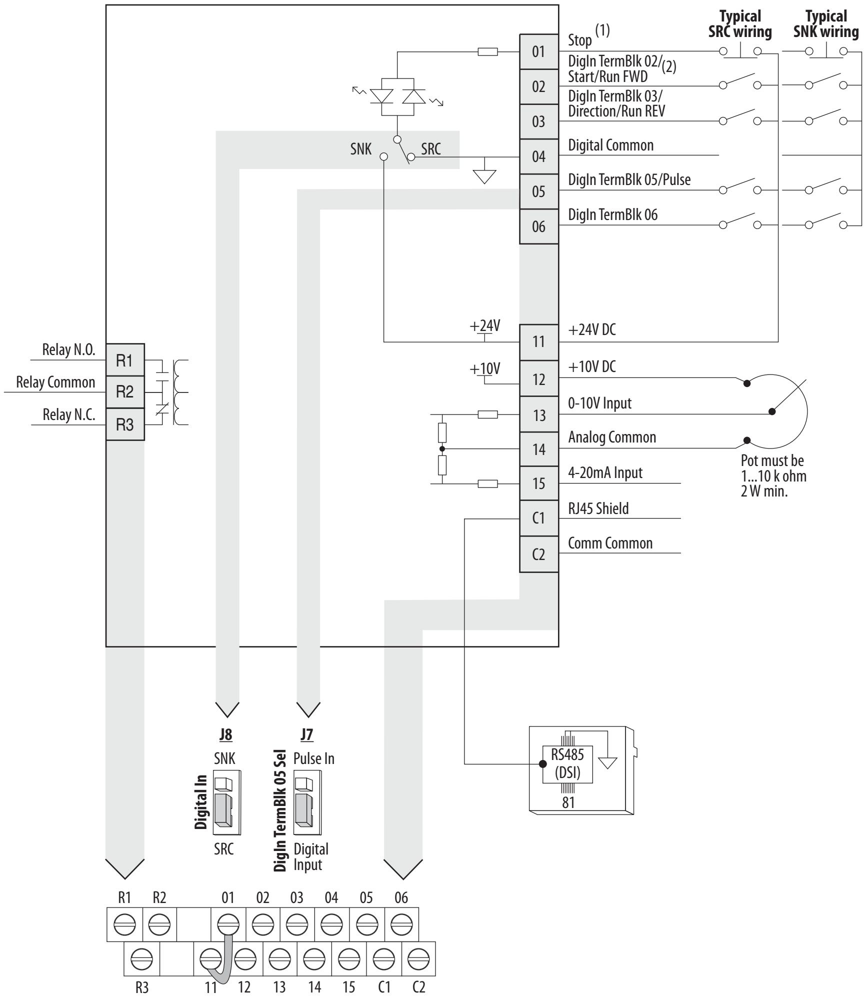
Control I/O Terminal Block Wire Specifications

Frame	Maximum Wire Size[1]	Minimum Wire Size[1]	Torque
A…E	1.3 mm^2 (16 AWG)	0.13 mm^2 (26 AWG)	0.71…0.86 Nm (6.2…7.6 lb-in.)

(1) Maximum/minimum sizes that the terminal block will accept – these are not recommendations.

PowerFlex 523 Control I/O Terminal Block

PowerFlex 523 Control I/O Wiring Block Diagram


Stop (1)
Typical SRC wiring
Typical SNK wiring
01
02
03
04
05
06
DigIn TermBlk 02/(2) Start/Run FWD
DigIn TermBlk 03/ Direction/Run REV
Digital Common
DigIn TermBlk 05/Pulse
DigIn TermBlk 06
SNK
SRC
+24V
+10V
11
12
13
14
15
C1
C2
+24V DC
+10V DC
0-10V Input
Analog Common
4-20mA Input
RJ45 Shield
Comm Common
Pot must be 1...10 k ohm 2 W min.
Relay N.O.
Relay Common
Relay N.C.
R1
R2
R3
J8
SNK
Digital In
SRC
J7
Pulse In
DigIn TermBlk 05 Sel
Digital Input
RS485 (DSI)
81
R1 R2 01 02 03 04 05 06
R3 11 12 13 14 15 C1 C2

Control I/O Wiring Block Diagram Notes

(1) See Digital Input Selection for Start Source on page 50 for more information on configuring the digital inputs.

IMPORTANT I/O Terminal 01 is always a stop input. The stopping mode is determined by the drive setting. See the tables below for more information.

P046, P048, P050 [Start Source x]	Normal Stop	I/O Terminal 01 Stop
1 "Keypad"	Per P045 [Stop Mode]	Coast
2 "DigIn TrmBlk"		See t062, t063 [DigIn TermBlk xx] below
3 "Serial/DSI"		Coast
4 "Network Opt"		Per P045 [Stop Mode]

t062, t063 [DigIn TermBlk xx]	Normal Stop	I/O Terminal 01 Stop
48 "2-Wire FWD"	Per P045 [Stop Mode]	See t064 [2-Wire Mode] below
49 "3-Wire Start"		Per P045 [Stop Mode]
50 "2-Wire REV"		See t064 [2-Wire Mode] below
51 "3-Wire Dir"		Per P045 [Stop Mode]

t064 [2-Wire Mode]	Normal Stop	I/O Terminal 01 Stop
0 "Edge Trigger"	Per P045 [Stop Mode]	Coast
1 "Level Sense"		Coast
2 "Hi-Spd Edge"		Coast
3 "Momentary"		Per P045 [Stop Mode]

IMPORTANT The drive is shipped with a jumper installed between I/O Terminals 01 and 11. Remove this jumper when using I/O Terminal 01 as a stop or enable input.

(2) Two wire control shown. For three wire control use a momentary input on I/O Terminal 02 to command a start. Use a maintained input for I/O Terminal 03 to change direction.

Control I/O Terminal Designations

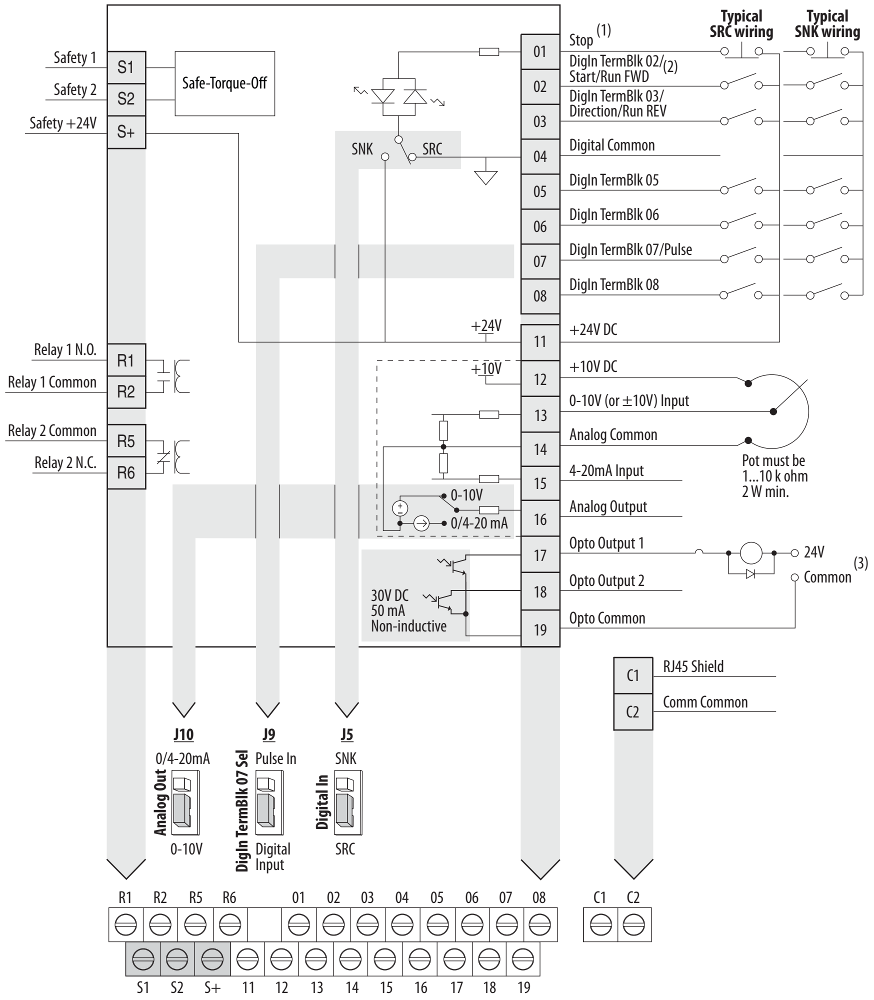
No.	Signal	Default	Description	Parameter
R1	Relay N.O.	Fault	Normally open contact for output relay.	t076
R2	Relay Common	Fault	Common for output relay.	
R3	Relay N.C.	Motor Running	Normally closed contact for output relay.	t081
01	Stop	Coast	Three wire stop. However, it functions as a stop under all input modes and cannot be disabled.	P045(2)
02	DigIn TermBlk 02/ Start/Run FWD	Run FWD	Used to initiate motion and also can be used as a programmable digital input. It can be programmed with t062 [DigIn TermBlk 02] as three wire (Start/Dir with Stop) or two wire (Run FWD/ Run REV) control. Current consumption is 6 mA.	P045, P046, P048, P050, A544, t062
03	DigIn TermBlk 03/ Dir/Run REV	Run REV	Used to initiate motion and also can be used as a programmable digital input. It can be programmed with t063 [DigIn TermBlk 03] as three wire (Start/Dir with Stop) or two wire (Run FWD/ Run REV) control. Current consumption is 6 mA.	t063
04	Digital Common	–	Return for digital I/O. Electrically isolated (along with the digital I/O) from the rest of the drive.	–
05	DigIn TermBlk 05/ Pulse In	Preset Freq	Program with t065 [DigIn TermBlk 05]. Also functions as a Pulse Train input for reference or speed feedback. The maximum frequency is 100 kHz. Current consumption is 6 mA.	t065
06	DigIn TermBlk 06	Preset Freq	Program with t066 [DigIn TermBlk 06]. Current consumption is 6 mA.	t066
11	+24V DC	–	Referenced to Digital Common. Drive supplied power for digital inputs. Maximum output current is 100 mA.	–
12	+10V DC	–	Referenced to Analog Common. Drive supplied power for 0…10V external potentiometer. Maximum output current is 15 mA.	P047, P049
13	0-10V In(1)	Not Active	For external 0-10V (unipolar) input supply or potentiometer wiper. Input impedance: Voltage source = 100 kΩ Allowable potentiometer resistance range = 1…10 kΩ	P047, P049, t062, t063, t065, t066, t093, A459, A471
14	Analog Common	–	Return for the analog I/O. Electrically isolated (along with the analog I/O) from the rest of the drive.	–
15	4-20mA In(1)	Not Active	For external 4-20 mA input supply. Input impedance = 250 Ω	P047, P049, t062, t063, t065, t066, A459, A471
C1	C1	–	This terminal is tied to the RJ-45 port shield. Tie this terminal to a clean ground in order to improve noise immunity when using external communication peripherals.	–
C2	C2	–	This is the signal common for the communication signals.	–

(1) Only one analog frequency source may be connected at a time. If more than one reference is connected at the same time, an undetermined frequency reference will result.

(2) See Footnote (1) on page 40.

PowerFlex 525 Control I/O Terminal Block

PowerFlex 525 Control I/O Wiring Block Diagram


Typical SRC wiring
Typical SNK wiring
Safety 1
Safety 2
Safety +24V
S1
S2
S+
Safe-Torque-Off
SNK
SRC
Stop (1)
DigIn TermBlk 02/ Start/Run FWD (2)
DigIn TermBlk 03/ Direction/Run REV
Digital Common
DigIn TermBlk 05
DigIn TermBlk 06
DigIn TermBlk 07/Pulse
DigIn TermBlk 08
+24V
+24V DC
+10V
+10V DC
0-10V (or ±10V) Input
Analog Common
4-20mA Input
Analog Output
Opto Output 1
Opto Output 2
Opto Common
Pot must be 1...10 k ohm 2 W min.
24V
Common
(3)
0-10V
0/4-20 mA
30V DC 50 mA Non-inductive
01
02
03
04
05
06
07
08
11
12
13
14
15
16
17
18
19
Relay 1 N.O.
Relay 1 Common
Relay 2 Common
Relay 2 N.C.
R1
R2
R5
R6
C1
C2
RJ45 Shield
Comm Common
J10
0/4-20mA
Analog Out
0-10V
J9
Pulse In
DigIn TermBlk 07 Sel
Digital Input
J5
SNK
Digital In
SRC
R1 R2 R5 R6 01 02 03 04 05 06 07 08 C1 C2
S1 S2 S+ 11 12 13 14 15 16 17 18 19

Control I/O Wiring Block Diagram Notes

(1) See Digital Input Selection for Start Source on page 50 for more information on configuring the digital inputs.

IMPORTANT I/O Terminal 01 is always a stop input. The stopping mode is determined by the drive setting. See the tables below for more information.

P046, P048, P050 [Start Source x]	Normal Stop	I/O Terminal 01 Stop
1 "Keypad"	Per P045 [Stop Mode]	Coast
2 "DigIn TrmBlk"		See t062, t063 [DigIn TermBlk xx] below
3 "Serial/DSI"		Coast
4 "Network Opt"		Per P045 [Stop Mode]
5 "EtherNet/IP"		Per P045 [Stop Mode]

t062, t063 [DigIn TermBlk xx]	Normal Stop	I/O Terminal 01 Stop
48 "2-Wire FWD"	Per P045 [Stop Mode]	See t064 [2-Wire Mode] below
49 "3-Wire Start"		Per P045 [Stop Mode]
50 "2-Wire REV"		See t064 [2-Wire Mode] below
51 "3-Wire Dir"		Per P045 [Stop Mode]

t064 [2-Wire Mode]	Normal Stop	I/O Terminal 01 Stop
0 "Edge Trigger"	Per P045 [Stop Mode]	Coast
1 "Level Sense"		Coast
2 "Hi-Spd Edge"		Coast
3 "Momentary"		Per P045 [Stop Mode]

IMPORTANT The drive is shipped with a jumper installed between I/O Terminals 01 and 11. Remove this jumper when using I/O Terminal 01 as a stop or enable input.

(2) Two wire control shown. For three wire control use a momentary input on I/O Terminal 02 to command a start. Use a maintained input for I/O Terminal 03 to change direction.

(3) When using an opto output with an inductive load such as a relay, install a recovery diode parallel to the relay as shown, to prevent damage to the output.

Control I/O Terminal Designations

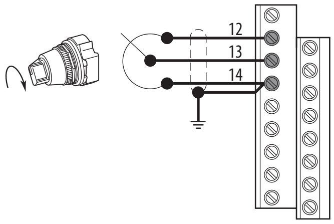
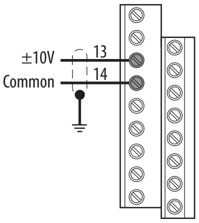
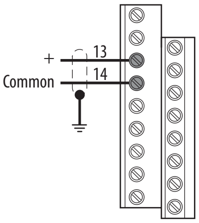
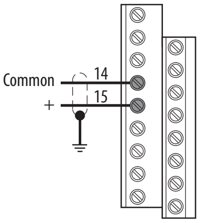
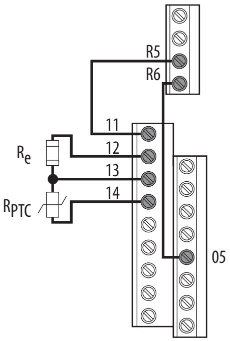
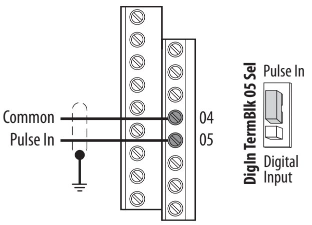
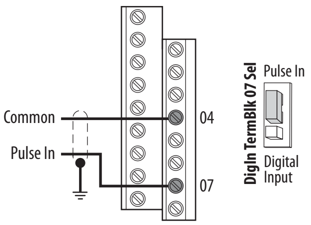
No.	Signal	Default	Description	Parameter
R1	Relay 1 N.O.	Fault	Normally open contact for output relay.	t076
R2	Relay 1 Common	Fault	Common for output relay.	
R5	Relay 2 Common	Motor Running	Common for output relay.	t081
R6	Relay 2 N.C.	Motor Running	Normally closed contact for output relay.	
01	Stop	Coast	Three wire stop. However, it functions as a stop under all input modes and cannot be disabled.	P045(1)
02	DigIn TermBlk 02/ Start/Run FWD	Run FWD	Used to initiate motion and also can be used as a programmable digital input. It can be programmed with t062 [DigIn TermBlk 02] as three wire (Start/Dir with Stop) or two wire (Run FWD/ Run REV) control. Current consumption is 6 mA.	P045, P046, P048, P050, A544, t062
03	DigIn TermBlk 03/ Dir/Run REV	Run REV	Used to initiate motion and also can be used as a programmable digital input. It can be programmed with t063 [DigIn TermBlk 03] as three wire (Start/Dir with Stop) or two wire (Run FWD/ Run REV) control. Current consumption is 6 mA.	t063
04	Digital Common	–	Return for digital I/O. Electrically isolated (along with the digital I/O) from the rest of the drive.	–
05	DigIn TermBlk 05	Preset Freq	Program with t065 [DigIn TermBlk 05]. Current consumption is 6 mA.	t065
06	DigIn TermBlk 06	Preset Freq	Program with t066 [DigIn TermBlk 06]. Current consumption is 6 mA.	t066
07	DigIn TermBlk 07/ Pulse In	Start Source 2 + Speed Reference2	Program with t067 [DigIn TermBlk 07]. Also functions as a Pulse Train input for reference or speed feedback. The maximum frequency is 100 kHz. Current consumption is 6 mA.	t067
08	DigIn TermBlk 08	Jog Forward	Program with t068 [DigIn TermBlk 08]. Current consumption is 6 mA.	t068
C1	C1	–	This terminal is tied to the RJ-45 port shield. Tie this terminal to a clean ground in order to improve noise immunity when using external communication peripherals.	–
C2	C2	–	This is the signal common for the communication signals.	–
S1	Safety 1	–	Safety input 1. Current consumption is 6 mA.	–
S2	Safety 2	–	Safety input 2. Current consumption is 6 mA.	–
S+	Safety +24V	–	+24V supply for safety circuit. Internally tied to the +24V DC source (Pin 11).	–

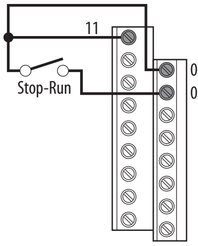
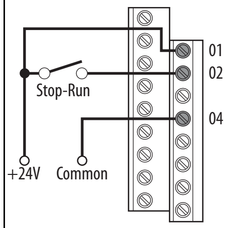
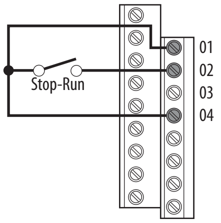
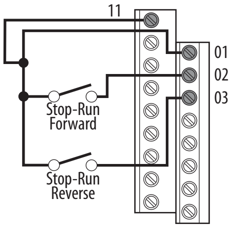
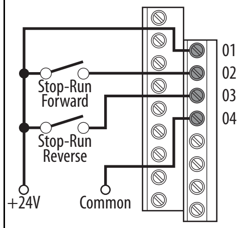
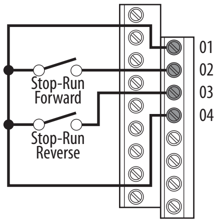
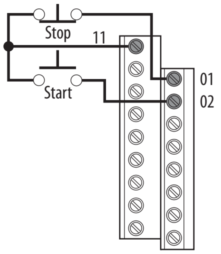
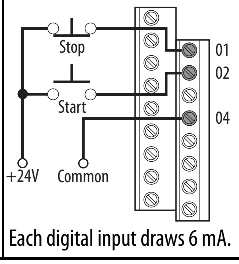
Control I/O Terminal Designations

No.	Signal	Default	Description	Parameter
11	+24V DC	–	Referenced to Digital Common. Drive supplied power for digital inputs. Maximum output current is 100 mA.	–
12	+10V DC	–	Referenced to Analog Common. Drive supplied power for 0…10V external potentiometer. Maximum output current is 15 mA.	P047, P049
13	±10V In	Not Active	For external 0-10V (unipolar) or ±10V (bipolar) input supply or potentiometer wiper. Input impedance: Voltage source = 100 kΩ Allowable potentiometer resistance range = 1…10 kΩ	P047, P049, t062, t063, t065, t066, t093, A459, A471
14	Analog Common	–	Return for the analog I/O. Electrically isolated (along with the analog I/O) from the rest of the drive.	–
15	4-20mA In	Not Active	For external 4-20 mA input supply. Input impedance = 250 Ω	P047, P049, t062, t063, t065, t066, A459, A471
16	Analog Output	OutFreq 0-10	The default analog output is 0-10V. To convert a current value, change the Analog Output jumper to 0-20 mA. Program with t088 [Analog Out Sel]. Maximum analog value can be scaled with t089 [Analog Out High]. Maximum Load: 4-20 mA = 525 Ω (10.5V) 0-10V = 1 kΩ (10 mA)	t088, t089
17	Opto Output 1	Motor Running	Program with t069 [Opto Out1 Sel]. Each Opto-Output is rated 30V DC 50 mA (Non-inductive).	t069, t070, t075
18	Opto Output 2	At Frequency	Program with t072 [Opto Out1 Sel]. Each Opto-Output is rated 30V DC 50 mA (Non-inductive).	t072, t073, t075
19	Opto Common	–	The emitters of the Optocoupler Outputs (1 and 2) are tied together at Optocoupler Common. Electrically isolated from the rest of the drive.	–

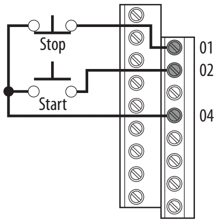
(1) See Footnote (1) on page 40.

I/O Wiring Examples

I/O	Connection Example
Potentiometer 1…10k Ω Pot. Recommended (2 W minimum)	P047 [Speed Reference1] = 5 “0-10V Input” 
Analog Input 0-10V, 100k Ω impedance 4-20 mA, 250 Ω impedance	Bipolar P047 [Speed Reference1] = 5 “0-10V Input” and t093 [10V Bipolar Enbl] = 1 “Bi-Polar In”  ±10V Common 13 14 Unipolar (Voltage) P047 [Speed Reference1] = 5 “0-10V Input”  + Common 13 14 Unipolar (Current) P047 [Speed Reference1] = 6 “4-20mA Input”  Common + 14 15
Analog Input, PTC For Drive Fault	Wire the PTC and External Resistor (typically matched to the PTC Hot Resistance) to I/O Terminals 12, 13, 14. Wire R2/R3 Relay Output (SRC) to I/O Terminals 5 & 11. t065 [DigIn TermBlk 05] = 12 “Aux Fault” t081 [Relay Out 2 Sel] = 10 “Above Anlg V” t082 [Relay Out 2 Level] = % Voltage Trip  R5 R6 11 12 13 14 Re RPTC 05 $\%V_{Trip} = \frac{R_{PTC\ (hot)}}{R_{PTC\ (hot)} + R_e} \text{ X } 100$
Pulse Train Input PowerFlex 523 t065 [DigIn TermBlk 05] = 52 PowerFlex 525 t067 [DigIn TermBlk 07] = 52 Use P047, P049 and P051 [Speed Referencex] to select pulse input. Jumper for DigIn TermBlk 05 or 07 Sel must be moved to Pulse In.	**PowerFlex 523**  Common Pulse In 04 05 DigIn TermBlk 05 Sel Pulse In Digital Input **PowerFlex 525**  Common Pulse In 04 07 DigIn TermBlk 07 Sel Pulse In Digital Input

I/O	**Connection Example**	
2 Wire SRC Control - Non-Reversing P046 [Start Source 1] = 2 and t062 [DigIn TermBlk 02] = 48 Input must be active for the drive to run. When input is opened, the drive will stop as specified by P045 [Stop Mode]. If desired, a User Supplied 24V DC power source can be used. Refer to the "External Supply (SRC)" example.	Internal Supply (SRC)  11 01 02 Stop-Run	External Supply (SRC)  01 02 04 Stop-Run +24V Common Each digital input draws 6 mA.
2 Wire SNK Control - Non-Reversing	Internal Supply (SNK)  01 02 03 04 Stop-Run	
2 Wire SRC Control - Run FWD/Run REV P046 [Start Source 1] = 2, t062 [DigIn TermBlk 02] = 48 and t063 [DigIn TermBlk 03] = 50 Input must be active for the drive to run. When input is opened, the drive will stop as specified by P045 [Stop Mode]. If both Run Forward and Run Reverse inputs are closed at the same time, an undetermined state could occur.	Internal Supply (SRC)  11 01 02 03 Stop-Run Forward Stop-Run Reverse	External Supply (SRC)  01 02 03 04 Stop-Run Forward Stop-Run Reverse +24V Common Each digital input draws 6 mA.
2 Wire SNK Control - Run FWD/Run REV	Internal Supply (SNK)  01 02 03 04 Stop-Run Forward Stop-Run Reverse	
3 Wire SRC Control - Non-Reversing P046 [Start Source 1] = 2 and t062 [DigIn TermBlk 02] = 49 A momentary input will start the drive. A stop input to I/O Terminal 01 will stop the drive as specified by P045 [Stop Mode].	Internal Supply (SRC)  Stop 11 Start 01 02	External Supply (SRC)  Stop Start 01 02 04 +24V Common Each digital input draws 6 mA.

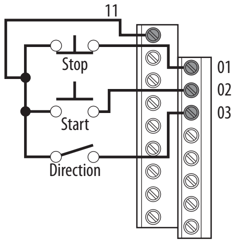
<table>
<tr><th>I/O</th><th colspan="2">Connection Example</th></tr>
<tr><td>3 Wire SNK Control - Non-Reversing</td><td colspan="2">Internal Supply (SNK)


Stop
Start
01
02
04

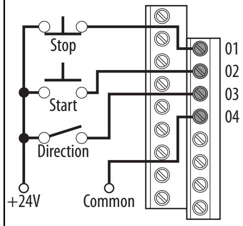
</td></tr>
<tr><td>3 Wire SRC Control - Reversing

P046 [Start Source 1] = 2, t062 [DigIn TermBlk 02] = 49 and t063 [DigIn TermBlk 03] = 51

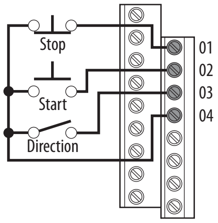
A momentary input will start the drive. A stop input to I/O Terminal 01 will stop the drive as specified by P045 [Stop Mode]. I/O Terminal 03 determines direction.</td><td>Internal Supply (SRC)


11
Stop
Start
Direction
01
02
03

</td><td>External Supply (SRC)


Stop
Start
Direction
+24V
Common
01
02
03
04

Each digital input draws 6 mA.</td></tr>
<tr><td>3 Wire SNK Control - Reversing</td><td colspan="2">Internal Supply (SNK)

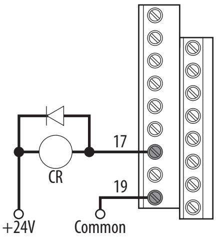

Stop
Start
Direction
01
02
03
04

</td></tr>
<tr><td>Opto Output (1 & 2)[1]

t069 [Opto Out1 Sel] determines Opto-Output 1 (I/O Terminal 17) operation.

t072 [Opto Out2 Sel] determines Opto-Output 2 (I/O Terminal 18) operation.

When using Opto-Output with an inductive load such as a relay, install a recovery diode parallel to the relay as shown, to prevent damage to the output.</td><td colspan="2">Opto-Output 1


17
CR
19
+24V
Common

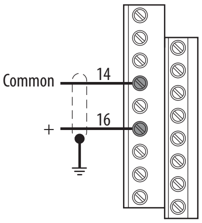
Each Opto-Output is rated 30V DC 50 mA (Non-inductive).</td></tr>
<tr><td>Analog Output[1]

t088 [Analog Out Sel] determines analog output type and drive conditions.

0-10V,
1k Ω minimum

0-20 mA/4-20 mA,
525 Ω maximum</td><td colspan="2">t088 [Analog Out Sel] = 0 through 23

The Analog Output Select jumper must be set to match the analog output signal mode set in t088 [Analog Out Sel].


Common
14
+
16

</td></tr>
</table>

---

(1) Feature is specific to PowerFlex 525 drives only.

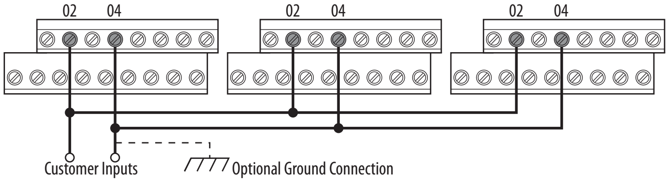
Typical Multiple Drive Connection Examples

<table>
<tr><th>Input/Output</th><th>Connection Example</th></tr>
<tr><td>

Multiple Digital Input Connections

Customer Inputs can be wired per External Supply (SRC).

</td><td>


02
04
02
04
02
04
Customer Inputs
Optional Ground Connection

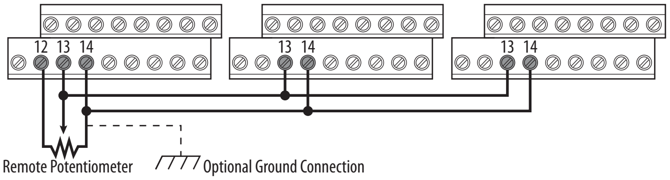
When connecting a single input such as Run, Stop, Reverse or Preset Speeds to multiple drives, it is important to connect I/O Terminal 04 common together for all drives. If they are to be tied into another common (such as earth ground or separate apparatus ground) only one point of the daisy chain of I/O Terminal 04 should be connected.

⚠ **ATTENTION:** I/O Common terminals should **not** be tied together when using SNK (Internal Supply) mode. In SNK mode, if power is removed from one drive, inadvertent operation of other drives that share the same I/O Common connection may occur.

</td></tr>
<tr><td>

Multiple Analog Connections

</td><td>


12
13
14
13
14
13
14
Remote Potentiometer
Optional Ground Connection

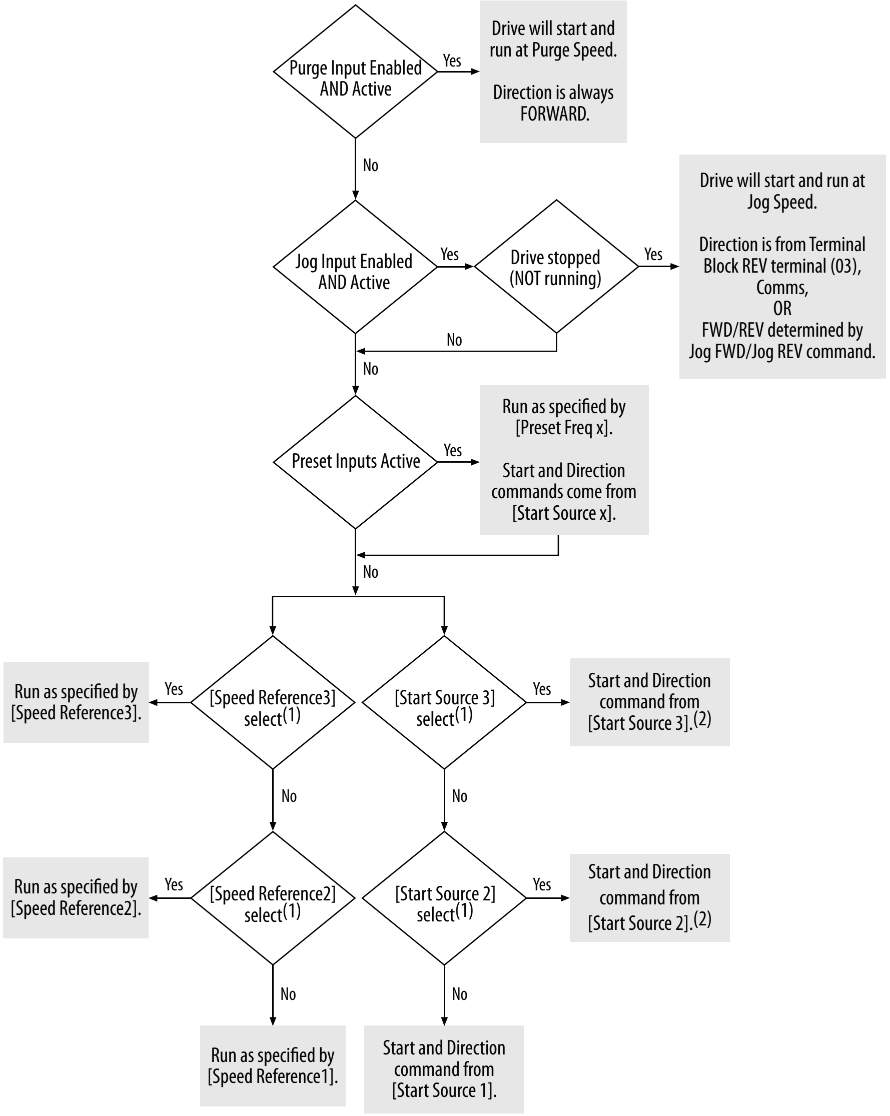
When connecting a single potentiometer to multiple drives it is important to connect I/O Terminal 14 common together for all drives. I/O Terminal 14 common and I/O Terminal 13 (potentiometer wiper) should be daisy-chained to each drive. All drives must be powered up for the analog signal to be read correctly.

</td></tr>
</table>

Start and Speed Reference Control

Start Source and Speed Reference Selection

The start and drive speed command can be obtained from a number of different sources. By default, start source is determined by P046 [Start Source 1] and drive speed source is determined by P047 [Speed Reference1]. However, various inputs can override this selection, See below for the override priority.

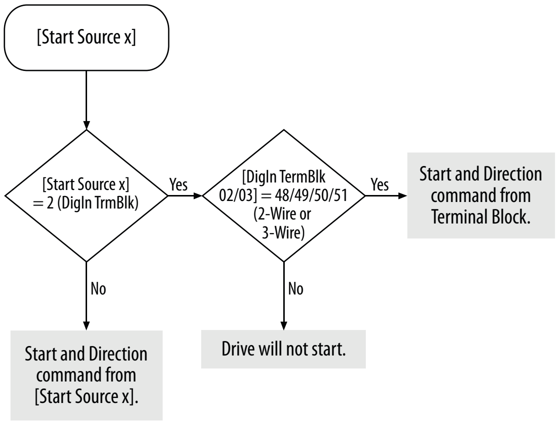

Purge Input Enabled AND Active
Yes
Drive will start and run at Purge Speed.
Direction is always FORWARD.
No
Jog Input Enabled AND Active
Yes
Drive stopped (NOT running)
Yes
Drive will start and run at Jog Speed.
Direction is from Terminal Block REV terminal (03), Comms, OR FWD/REV determined by Jog FWD/Jog REV command.
No
No
Preset Inputs Active
Yes
Run as specified by [Preset Freq x].
Start and Direction commands come from [Start Source x].
No
Run as specified by [Speed Reference3].
Yes
[Speed Reference3] select(1)
[Start Source 3] select(1)
Yes
Start and Direction command from [Start Source 3].(2)
No
No
Run as specified by [Speed Reference2].
Yes
[Speed Reference2] select(1)
[Start Source 2] select(1)
Yes
Start and Direction command from [Start Source 2].(2)
No
No
Run as specified by [Speed Reference1].
Start and Direction command from [Start Source 1].

(1) [Start Source 2/3] and [Speed Reference2/3] can be selected by the control terminal block or communication commands.

(2) See Digital Input Selection for Start Source on page 50 for information on selecting the correct digital input.

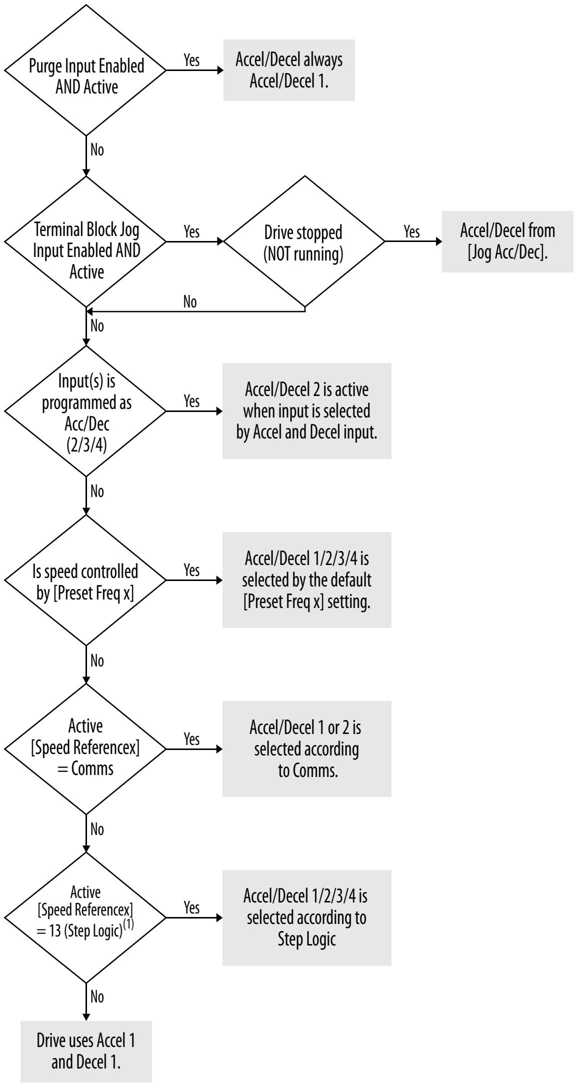
Digital Input Selection for Start Source

If P046, P048 or P050 [Start Source x] has been set to 2, “DigIn TermBlk”, then t062 and t063 [DigIn TermBlk xx] must be configured for 2-Wire or 3-Wire control for the drive to function properly.


[Start Source x]
[Start Source x] = 2 (DigIn TrmBlk)
Yes
[DigIn TermBlk 02/03] = 48/49/50/51 (2-Wire or 3-Wire)
Yes
Start and Direction command from Terminal Block.
No
Start and Direction command from [Start Source x].
No
Drive will not start.

Accel/Decel Selection

The Accel/Decel rate can be obtained by a variety of methods. The default rate is determined by P041 [Accel Time 1] and P042 [Decel Time 1]. Alternative Accel/Decel rates can be made through digital inputs, communications and/or parameters. See below for the override priority.


Purge Input Enabled AND Active
Yes
Accel/Decel always Accel/Decel 1.
No
Terminal Block Jog Input Enabled AND Active
Yes
Drive stopped (NOT running)
Yes
Accel/Decel from [Jog Acc/Dec].
No
No
Input(s) is programmed as Acc/Dec (2/3/4)
Yes
Accel/Decel 2 is active when input is selected by Accel and Decel input.
No
Is speed controlled by [Preset Freq x]
Yes
Accel/Decel 1/2/3/4 is selected by the default [Preset Freq x] setting.
No
Active [Speed Referencex] = Comms
Yes
Accel/Decel 1 or 2 is selected according to Comms.
No
Active [Speed Referencex] = 13 (Step Logic)(1)
Yes
Accel/Decel 1/2/3/4 is selected according to Step Logic
No
Drive uses Accel 1 and Decel 1.

(1) Setting is specific to PowerFlex 525 drives only.

CE Conformity

Compliance with the Low Voltage Directive and Electromagnetic Compatibility Directive has been demonstrated using harmonized European Norm (EN) standards published in the Official Journal of the European Communities. PowerFlex 520-series drives comply with the EN standards listed below when installed according to the installation instructions in this manual.

CE Declarations of Conformity are available online at: http://www.rockwellautomation.com/products/certification/.

Low Voltage Directive (2006/95/EC)

- EN 61800-5-1 Adjustable speed electrical power drive systems – Part 5-1: Safety requirements – Electrical, thermal and energy.

Pollution Degree Ratings According to EN 61800-5-1

Pollution Degree	Description
1	No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.
2	Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation is to be expected, when the drive is out of operation.

EMC Directive (2004/108/EC)

- EN 61800-3:2004 – Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods

Machinery Directive (2006/42/EC)

- EN ISO 13849-1:2008 – Safety of machinery – Safety related parts of control systems -Part 1: General principles for design
- EN 62061:2005 – Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems
- EN 60204-1:2006 – Safety of machinery – Electrical equipment of machines - Part 1: General requirements
- EN 61800-5-2:2007 – Adjustable speed electrical power drive systems - Part 5-2: Safety requirement – Functional

Refer to Appendix G for installation consideration related to Machinery Directive.

General Considerations

- For CE compliance, drives must satisfy installation requirements related to both EN 61800-5-1 and EN 61800-3 provided in this document.
- PowerFlex 520-series drives must be installed in a pollution degree 1 or 2 environment to be compliant with the CE LV Directive. See Pollution Degree Ratings According to EN 61800-5-1 on page 52 for descriptions of each pollution degree rating.
- PowerFlex 520-series drives comply with the EMC requirements of EN 61800-3 when installed according to good EMC practices and the instructions provided in this document. However, many factors can influence the EMC compliance of an entire machine or installation, and compliance of the drive itself does not ensure compliance of all applications.

- PowerFlex 520-series drives are not intended to be used on public low-voltage networks which supply domestic premises. Without additional mitigation, radio frequency interference is expected if used on such a network. The installer is responsible for taking measures such as a supplementary line filter and enclosure (see Connections and Grounding on page 55) to prevent interference, in addition to the installation requirements of this document.

ATTENTION: NEMA/UL Open Type drives must either be installed in a supplementary enclosure or equipped with a "NEMA Type 1 Kit" to be CE compliant with respect to protection against electrical shock.

- PowerFlex 520-series drives generate harmonic current emissions on the AC supply system. When operated on a public low-voltage network it is the responsibility of the installer or user to ensure that applicable requirements of the distribution network operator have been met. Consultation with the network operator and Rockwell Automation may be necessary.
- If the optional NEMA 1 kit is not installed, the drive must be installed in an enclosure with side openings less than 12.5 mm (0.5 in.) and top openings less than 1.0 mm (0.04 in.) to maintain compliance with the LV Directive.
- The motor cable should be kept as short as possible in order to avoid electromagnetic emission as well as capacitive currents.
- Use of line filters in ungrounded systems is not recommended.
- In CE installations, input power must be a Balanced Wye with Center Ground configuration for EMC compliance.

Installation Requirements Related to EN 61800-5-1 and the Low Voltage Directive

- 600V PowerFlex 520-series drives can only be used on a "center grounded" supply system for altitudes up to and including 2000 m (6562 ft).
- When used at altitudes above 2000 m (6562 ft) up to a maximum of 4800 m (15,748 ft), PowerFlex 520-series drives of voltage classes up to 480V may not be powered from a "corner-earthed" supply system in order to maintain compliance with the CE LV Directive. See Derating Guidelines for High Altitude on page 18.

- PowerFlex 520-series drives produce leakage current in the protective earthing conductor which exceeds 3.5 mA AC and/or 10 mA DC. The minimum size of the protective earthing (grounding) conductor used in the application must comply with local safety regulations for high protective earthing conductor current equipment.

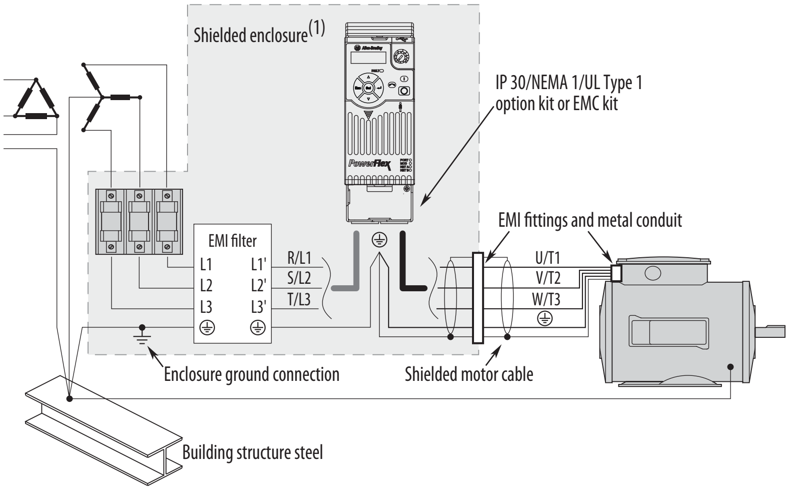
ATTENTION: PowerFlex 520-series drives produce DC current in the protective earthing conductor which may reduce the ability of RCD's (residual current-operated protective devices) or RCM's (residual current-operated monitoring devices) of type A or AC to provide protection for other equipment in the installation. Where an RCD or RCM is used for protection in case of direct or indirect contact, only an RCD or RCM of Type B is allowed on the supply side of this product.

Installation Requirements Related to EN 61800-3 and the EMC Directive

- The drive must be earthed (grounded) as described in Connections and Grounding on page 55. See General Grounding Requirements on page 20 for additional grounding recommendations.
- Output power wiring to the motor must employ cables with a braided shield providing 75% or greater coverage, or the cables must be housed in metal conduit, or equivalent shield must be provided. Continuous shielding must be provided from the drive enclosure to the motor enclosure. Both ends of the motor cable shield (or conduit) must terminate with a low-impedance connection to earth.
  Drive Frames A…E: At the drive end of the motor, either
  a. The cable shield must be clamped to a properly installed "EMC Plate" for the drive. Kit number 25-EMC1-Fx.
  or
  b. The cable shield or conduit must terminate in a shielded connector installed in an EMC plate, conduit box, or similar.
- At the motor end, the motor cable shield or conduit must terminate in a shielded connector which must be properly installed in an earthed motor wiring box attached to the motor. The motor wiring box cover must be installed and earthed.
- All control (I/O) and signal wiring to the drive must use cable with a braided shield providing 75% or greater coverage, or the cables must be housed in metal conduit, or equivalent shielding must be provided. When shielded cable is used, the cable shield should be terminated with a low impedance connection to earth at only one end of the cable, preferably the end where the receiver is located. When the cable shield is terminated at the drive end, it may be terminated either by using a shielded connector in conjunction with a conduit plate or conduit box, or the shield may be clamped to an "EMC plate."
- Motor cabling must be separated from control and signal wiring wherever possible.

- Maximum motor cable length must not exceed the maximum length indicated in PowerFlex 520-Series RF Emission Compliance and Installation Requirements on page 55 for compliance with radio frequency emission limits for the specific standard and installation environment.

Connections and Grounding


Shielded enclosure(1)
IP 30/NEMA 1/UL Type 1 option kit or EMC kit
EMI fittings and metal conduit
EMI filter
L1
L2
L3
L1'
L2'
L3'
R/L1
S/L2
T/L3
U/T1
V/T2
W/T3
Enclosure ground connection
Shielded motor cable
Building structure steel

(1) Some installations require a shielded enclosure. Keep wire length as short as possible between the enclosure entry point and the EMI filter.

PowerFlex 520-Series RF Emission Compliance and Installation Requirements

Filter Type	**Standard/Limits**		
	EN61800-3 Category C1 **EN61000-6-3** **CISPR11 Group 1 Class B**	**EN61800-3 Category C2** **EN61000-6-4** **CISPR11 Group 1 Class A (Input power ≤ 20 kVA)**	**EN61800-3 Category C3 (I ≤ 100 A)** **CISPR11 Group 1 Class A (Input power > 20 kVA)**
Internal	–	10 m (33 ft)	20 m (66 ft)
External[1]	30 m (16 ft)	100 m (328 ft)	100 m (328 ft)

(1) See Appendix B for more information on optional external filters.

Additional Installation Requirements

This section provides information on additional requirements for Class C1 and C2 installation, such as enclosures and EMC cores.

IMPORTANT EMC cores are included with:

- drives that have an internal EMC filter (25x-xxxxN114)
- external EMC filter accessory kit (25-RFxxx)

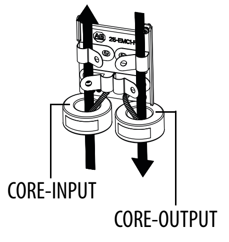
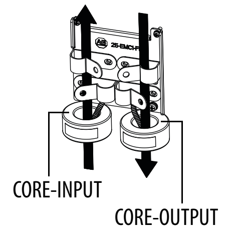
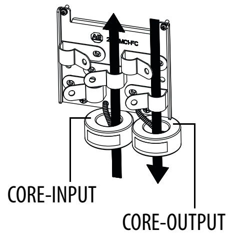
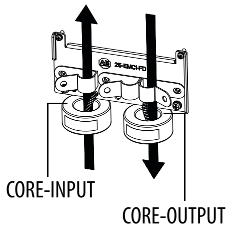
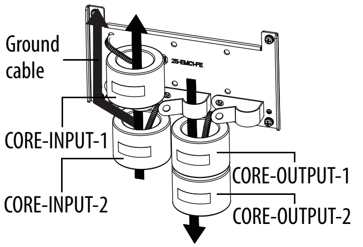
Additional Installation Requirements

Frame Size	**Class C1**		**Class C2**	
	Enclosure and Conduit Cable (Input and Output)	**EMC Cores Required (Included with product)**	**Enclosure**	**EMC Cores Required (Included with product)**
200…240V AC (-15%, +10%) – 1-Phase Input with External EMC Filter, 0…230V 3-Phase Output				
A	Shielded	None	None	INPUT (CORE-RF-A-1) / OUTPUT (CORE-RF-A-2)
B	Shielded	OUTPUT (CORE-RF-B-2)	None	INPUT (CORE-RF-B-1) / OUTPUT (CORE-RF-B-2)

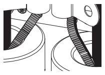
Additional Installation Requirements

Frame Size	Class C1		Class C2	
	Enclosure and Conduit Cable (Input and Output)	**EMC Cores Required (Included with product)**	**Enclosure**	**EMC Cores Required (Included with product)**
200…240V AC (-15%, +10%) – 1-Phase Input with Internal EMC Filter, 0…230V 3-Phase Output				
A	–	–	Shielded	None
B	–	–	Shielded	None
200…240V AC (-15%, +10%) – 3-Phase Input with External EMC Filter, 0…230V 3-Phase Output				
A	Shielded	OUTPUT (CORE-RF-A-2)	None	INPUT (CORE-RF-A-1) / OUTPUT (CORE-RF-A-2)
B	Shielded	OUTPUT (CORE-RF-B-2)	None	INPUT (CORE-RF-B-1) / OUTPUT (CORE-RF-B-2)
C	Shielded	OUTPUT (CORE-RF-C-2)	None	INPUT (CORE-RF-C-1) / OUTPUT (CORE-RF-C-2)
D	Shielded	None	None	INPUT (CORE-RF-D-1)
E	Shielded	OUTPUT (CORE-RF-E-1)	None	INPUT (CORE-RF-E-1)
380…480V AC (-15%, +10%) – 3-Phase Input with External EMC Filter, 0…460V 3-Phase Output				
A	Shielded	None	None	INPUT (CORE-RF-A-1) / OUTPUT (CORE-RF-A-2)
B	Shielded	None	None	INPUT (CORE-RF-B-1) / OUTPUT (CORE-RF-B-2)
C	Shielded	None	None	INPUT (CORE-RF-C-1)
D	Shielded	OUTPUT (CORE-RF-D-2)	None	INPUT (CORE-RF-D-1) / OUTPUT (CORE-RF-D-2)
E	Shielded	None	Shielded	INPUT -1 (CORE-E-1) and INPUT-2 (CORE-E-2) / OUTPUT-1 (CORE-E-3) and OUTPUT-2 (CORE-E-4)
380…480V AC (-15%, +10%) – 3-Phase Input with Internal EMC Filter, 0…460V 3-Phase Output				
A	–	–	None	INPUT (CORE-A-1) / OUTPUT (CORE-A-2)
B	–	–	None	INPUT (CORE-B-1) / OUTPUT (CORE-B-2)
C	–	–	None	INPUT (CORE-C-1) / OUTPUT (CORE-C-2)
D	–	–	None	INPUT (CORE-D-1) / OUTPUT (CORE-D-2)
E	–	–	None	INPUT -1 (CORE-E-1) and INPUT-2 (CORE-E-2) / OUTPUT-1 (CORE-E-3) and OUTPUT-2 (CORE-E-4)
525…600V AC (-15%, +10%) – 3-Phase Input with External EMC Filter, 0…575V 3-Phase Output				
A	Metal Enclosure	None	None	INPUT (CORE-RF-B-1) / OUTPUT (CORE-RF-B-2)
B	Metal Enclosure	None	None	INPUT (CORE-RF-B-1) / OUTPUT (CORE-RF-B-2)
C	Metal Enclosure	None	None	INPUT (CORE-RF-C-1) / OUTPUT (CORE-RF-C-2)
D	Metal Enclosure	None	None	INPUT (CORE-RF-D-1) / OUTPUT (CORE-RF-D-2)
E	Metal Enclosure	None	Metal Enclosure	None

Recommended Placement of EMC Cores with Optional EMC Plate

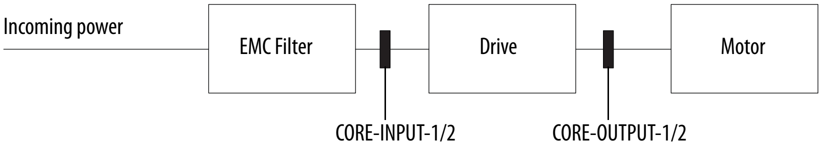
Frame A	Frame B	Frame C	Frame D	Frame E
↑ **Input cable to drive (Shielded or Unshielded)**				
				 Ground cable CORE-INPUT-1 CORE-INPUT-2 CORE-OUTPUT-1 CORE-OUTPUT-2
↓ **Output cable from drive (Shielded)**				

Shows contact to shielded layer


Shows cable/zip tie for securing EMC Core

Recommended Placement of EMC Cores Relative to External Filter

All Frame sizes


Incoming power
EMC Filter
Drive
Motor
CORE-INPUT-1/2
CORE-OUTPUT-1/2

IMPORTANT	The ground cable/shield for both input and output must pass through the EMC core(s), except for the following: • Frame E drives with internal filters where the grounded input cable must not pass through EMC CORE-E-1. • 600V drives with external filters where the grounded output cable must not pass through the EMC core(s).

Notes:

Chapter 2

Start Up

This chapter describes how to start up the PowerFlex 520-series drive. To simplify drive setup, the most commonly programmed parameters are organized in a single Basic Program Group.

For information on...	See page...
Prepare for Drive Start-Up	59
Display and Control Keys	62
Viewing and Editing Parameters	63
Drive Programming Tools	64
Smart Start-Up with Basic Program Group Parameters	65
LCD & Scrolling Description	67
Using the USB Port	67

IMPORTANT Read the *General Precautions* section before proceeding.

ATTENTION: Power must be applied to the drive to perform the following start-up procedures. Some of the voltages present are at incoming line potential. To avoid electric shock hazard or damage to equipment, only qualified service personnel should perform the following procedure. Thoroughly read and understand the procedure before beginning. If an event does not occur while performing this procedure, **Do Not Proceed. Remove All Power** including user supplied control voltages. User supplied voltages may exist even when main AC power is not applied to the drive. Correct the malfunction before continuing.

Prepare for Drive Start-Up

Drive Startup Task List

1. Disconnect and lock out power to the machine.
2. Verify that AC line power at the disconnect device is within the rated value of the drive.
3. If replacing a drive, verify the current drive's catalog number. Verify all options installed on the drive.
4. Verify that any digital control power is 24 volts.
5. Inspect grounding, wiring, connections, and environmental compatibility.

6. Verify that the Sink (SNK)/Source (SRC) jumper is set to match your control wiring scheme. See the PowerFlex 523 Control I/O Wiring Block Diagram on page 40 and PowerFlex 525 Control I/O Wiring Block Diagram on page 42 for location.

IMPORTANT	The default control scheme is Source (SRC). The Stop terminal is jumpered to allow starting from the keypad or comms. If the control scheme is changed to Sink (SNK), the jumper must be removed from I/O Terminals 01 and 11 and installed between I/O Terminals 01 and 04.

7. Wire I/O as required for the application.
8. Wire the power input and output terminals.
9. Confirm that all inputs are connected to the correct terminals and are secure.
10. Collect and record motor nameplate and encoder or feedback device information. Verify motor connections.
    - Is the motor uncoupled?
    - What direction will the motor need to turn for the application?
11. Verify the input voltage to the drive. Verify if the drive is on a grounded system. Ensure the MOV jumpers are in the correct position. See AC Supply Source Considerations on page 19 for more information.
12. Apply power and reset the drive and communication adapters to factory default settings. To reset the drive, see parameter P053 [Reset to Defalts]. To reset the communication adapters, see the user manual of the adapter for more information.
13. Configure the basic program parameters related to the motor. See Smart Start-Up with Basic Program Group Parameters on page 65.
14. Complete the autotune procedure for the drive. See parameter P040 [Autotune] for more information.
15. If you are replacing a drive and have a backup of the parameter settings obtained using the USB utility application, use the USB utility application to apply the backup to the new drive. See Using the USB Port on page 67 for more information.

    Otherwise, set the necessary parameters for your application using the LCD keypad interface, Connected Components Workbench, or RSLogix or Logix Designer if using an Add-on Profile through EtherNet/IP.
    - Configure the communication parameters needed for the application (node number, IP address, datalinks in and out, communication rate, speed reference, start source, and so on). Record these settings for your reference.
    - Configure the other drive parameters needed for the drive analog and digital I/O to work correctly. Verify the operation. Record these settings for your reference.

16. Verify the drive and motor perform as specified.
    - Verify that the Stop input is present or the drive will not start.

IMPORTANT	If I/O Terminal 01 is used as a stop input, the jumper between I/O Terminals 01 and 11 must be removed.

    - Verify the drive is receiving the speed reference from the correct place and that the reference is scaled correctly.
    - Verify the drive is receiving start and stop commands correctly.
    - Verify input currents are balanced.
    - Verify motor currents are balanced.
17. Save a backup of the drive settings using the USB utility application. See Using the USB Port on page 67 for more information.

Start, Stop, Direction and Speed Control

Factory default parameter values allow the drive to be controlled from the keypad. No programming is required to start, stop, change direction and control speed directly from the keypad.

IMPORTANT	To disable reverse operation, see A544 [Reverse Disable].

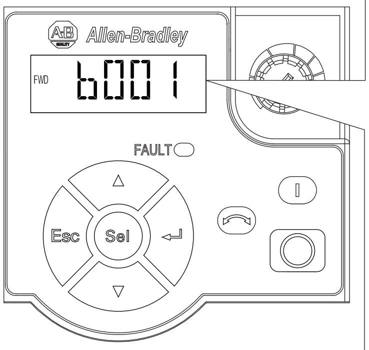
If a fault appears on power up, see Fault Descriptions on page 149 for an explanation of the fault code.

Variable Torque Fan/Pump Applications

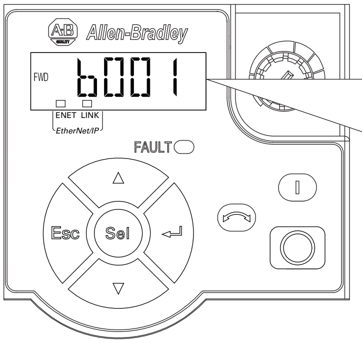
For improved motor tuning performance when using a premium efficient motor on a variable torque loading SVC mode, set A530 [Boost Select] to 2 “35.0, VT”.

Display and Control Keys

PowerFlex 523



PowerFlex 525



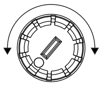
Menu	Parameter Group and Description
b	**Basic Display** Commonly viewed drive operating conditions.
P	**Basic Program** Commonly used programmable functions.
t	**Terminal Blocks** Programmable terminal functions.
C	**Communications** Programmable communication functions.
L	**Logic (PowerFlex 525 only)** Programmable logic functions.
d	**Advanced Display** Advanced drive operating conditions.
A	**Advanced Program** Remaining programmable functions.
N	**Network** Network functions that are shown only when a comm card is used.
M	**Modified** Functions from the other groups with values changed from default.
f	**Fault and Diagnostic** Consists of list of codes for specific fault conditions.
G	**AppView and CustomView** Functions from the other groups organized for specific applications.

Control and Navigation Keys

Display	Display State	Description
ENET (PowerFlex 525 only)	Off	Adapter is not connected to the network.
	Steady	Adapter is connected to the network and drive is controlled through Ethernet.
	Flashing	Adapter is connected to the network but drive is not controlled through Ethernet.
LINK (PowerFlex 525 only)	Off	Adapter is not connected to the network.
	Steady	Adapter is connected to the network but not transmitting data.
	Flashing	Adapter is connected to the network and transmitting data.

LED	LED State	Description
FAULT	Flashing Red	Indicates drive is faulted.

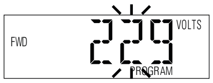
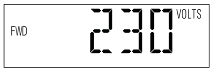
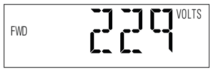
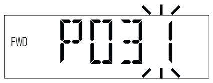
Key	Name	Description
△ ▽	Up Arrow Down Arrow	Scroll through user-selectable display parameters or groups. Increment values.
Esc	Escape	Back one step in programming menu. Cancel a change to a parameter value and exit Program Mode.
Sel	Select	Advance one step in programming menu. Select a digit when viewing parameter value.
↵	Enter	Advance one step in programming menu. Save a change to a parameter value.

Key	Name	Description
	Reverse	Used to reverse direction of the drive. Default is active. Controlled by parameters P046, P048 and P050 [Start Source x] and A544 [Reverse Disable].
	Start	Used to start the drive. Default is active. Controlled by parameters P046, P048 and P050 [Start Source x].
◎	Stop	Used to stop the drive or clear a fault. This key is always active. Controlled by parameter P045 [Stop Mode].
	Potentiometer	Used to control speed of drive. Default is active. Controlled by parameters P047, P049 and P051 [Speed Referencex].

Viewing and Editing Parameters

The following is an example of basic integral keypad and display functions. This example provides basic navigation instructions and illustrates how to program a parameter.

Step	Key(s)	Example Display
1. When power is applied, the last user-selected Basic Display Group parameter number is briefly displayed with flashing characters. The display then defaults to that parameter's current value. (Example shows the value of b001 [Output Freq] with the drive stopped.)		FWD 0.00 HERTZ
2. Press Esc to display the Basic Display Group parameter number shown on power-up. The parameter number will flash.	Esc	FWD b001
3. Press Esc to enter the parameter group list. The parameter group letter will flash.	Esc	FWD b001
4. Press the Up Arrow or Down Arrow to scroll through the group list (b, P, t, C, L, d, A, f and Gx).	△ or ▽	FWD P031
5. Press Enter or Sel to enter a group. The right digit of the last viewed parameter in that group will flash.	⏎ or Sel	FWD P031
6. Press the Up Arrow or Down Arrow to scroll through the parameter list.	△ or ▽	FWD P031
7. Press Enter to view the value of the parameter. Or Press Esc to return to the parameter list.	⏎	FWD 230 VOLTS
8. Press Enter or Sel to enter Program Mode and edit the value. The right digit will flash and the word Program on the LCD display will light up.	⏎ or Sel	FWD 230 VOLTS PROGRAM
9. Press the Up Arrow or Down Arrow to change the parameter value.	△ or ▽	FWD 229 VOLTS PROGRAM

Step	Key(s)	Example Display
10. If desired, press Sel to move from digit to digit or bit to bit. The digit or bit that you can change will flash.	Sel	
11. Press Esc to cancel a change and exit Program Mode. Or Press Enter to save a change and exit Program Mode. The digit will stop flashing and the word Program on the LCD display will turn off.	Esc or ⏎	 or 
12. Press Esc to return to the parameter list. Continue to press Esc to back out of the programming menu. If pressing Esc does not change the display, then b001 [Output Freq] is displayed. Press Enter or Sel to enter the group list again.	Esc	

Drive Programming Tools

Some features in the PowerFlex 520-series drive are not supported by older configuration software tools. It is strongly recommended that customers using such tools migrate to RSLogix 5000 (version 17.0 or greater) or Logix Designer (version 21.0 or greater) with Add-On-Profile (AOP), or Connected Components Workbench (version 5.0 or greater) to enjoy a richer, full-featured configuration experience.

Description	Catalog Number/Release Version
Connected Components Workbench(1)	Version 5.0 or greater
Logix Designer	Version 21.0 or greater
RSLogix 5000	Version 17.0 or greater
Built-in USB software tool	–
Serial Converter Module(2)	22-SCM-232
USB Converter Module(2)	1203-USB
Remote Panel Mount, LCD Display(2)	22-HIM-C2S
Remote Handheld, LCD Display(2)	22-HIM-A3

(1) Available as a free download at http://ab.rockwellautomation.com/programmable-controllers/connected-components-workbench-software.

(2) Does not support the new dynamic parameter groups (AppView, CustomView), and CopyCat functionality is limited to the linear parameter list.

Language Support

Language	Keypad/LCD Display	RSLogix 5000/ Logix Designer	Connected Components Workbench
English	Y	Y	Y
French	Y	Y	Y
Spanish	Y	Y	Y
Italian	Y	Y	Y
German	Y	Y	Y
Japanese	–	Y	–
Portuguese	Y	Y	–
Chinese Simplified	–	Y	Y
Korean	–	Y	–

Language	Keypad/LCD Display	RSLogix 5000/ Logix Designer	Connected Components Workbench
Polish(1)	Y	–	–
Turkish(1)	Y	–	–
Czech(1)	Y	–	–

(1) Due to a limitation of the LCD Display, some of the characters for Polish, Turkish, and Czech will be modified.

Smart Start-Up with Basic Program Group Parameters

The PowerFlex 520-series drive is designed so that start up is simple and efficient. The Basic Program Group contains the most commonly used parameters. See Programming and Parameters on page 69 for detailed descriptions of the parameters listed here, as well as the full list of available parameters.

○ = Stop drive before changing this parameter.
PF 525 = Parameter is specific to PowerFlex 525 drives only.

No.	Parameter	Min/Max	Display/Options	Default
P030	[Language] Selects the language displayed. **Important:** The setting takes effect after the drive is power cycled.	1/15	1 = English 2 = Français 3 = Español 4 = Italiano 5 = Deutsch 6 = Japanese 7 = Português 8 = Chinese 9 = Reserved 10 = Reserved 11 = Korean 12 = Polish 13 = Reserved 14 = Turkish 15 = Czech	1
P031 ○	[Motor NP Volts] Sets the motor nameplate rated volts.	10V (for 200V Drives), 20V (for 400V Drives), 25V (for 600V Drives)/Drive Rated Volts	1V	Based on Drive Rating
P032 ○	[Motor NP Hertz] Sets the motor nameplate rated frequency.	15/500 Hz	1 Hz	60 Hz
P033	[Motor OL Current] Sets the motor nameplate overload current.	0.0/(Drive Rated Amps × 2)	0.1 A	Based on Drive Rating
P034	[Motor NP FLA] Sets the motor nameplate FLA.	0.0/(Drive Rated Amps x 2)	0.1 A	Drive Rated Amps
P035	[Motor NP Poles] Sets the number of poles in the motor.	2/40	1	4
P036 ○	[Motor NP RPM] Sets the rated nameplate rpm of motor.	0/24000 rpm	1 rpm	1750 rpm
P037 PF 525	[Motor NP Power] Sets the motor nameplate power. Used in PM regulator.	0.00/Drive Rated Power	0.01 kW	Drive Rated Power
P038 ○	[Voltage Class] Sets the voltage class of 600V drives. Only applicable to 600V drives.	2/3	2 = "480V" 3 = "600V"	3
P039 ○	[Torque Perf Mode] Selects the motor control mode. (1) Setting is specific to PowerFlex 525 drives only.	0/3	0 = "V/Hz" 1 = "SVC" 2 = "Economize" 3 = "Vector"(1)	1

○ = Stop drive before changing this parameter.
PF 525 = Parameter is specific to PowerFlex 525 drives only.

No.	Parameter	Min/Max	Display/Options	Default
P040	[Autotune]	0/2	0 = "Ready/Idle" 1 = "Static Tune" 2 = "Rotate Tune"	0
○	Enables a static (not spinning) or dynamic (motor spinning) autotune.			
P041	[Accel Time 1]	0.00/600.00 s	0.01 s	10.00 s
	Sets the time for the drive to accel from 0 Hz to [Maximum Freq].			
P042	[Decel Time 1]	0.00/600.00 s	0.01 s	10.00 s
	Sets the time for the drive to decel from [Maximum Freq] to 0 Hz.			
P043	[Minimum Freq]	0.00/500.00 Hz	0.01 Hz	0.00 Hz
○	Sets the lowest frequency the drive outputs.			
P044	[Maximum Freq]	0.00/500.00 Hz	0.01 Hz	60.00 Hz
○	Sets the highest frequency the drive outputs.			
P045	[Stop Mode]	0/11	0 = "Ramp, CF"(1) 1 = "Coast, CF"(1) 2 = "DC Brake, CF"(1) 3 = "DCBrkAuto,CF"(1) 4 = "Ramp" 5 = "Coast" 6 = "DC Brake" 7 = "DC BrakeAuto" 8 = "Ramp+EM B,CF"(1) 9 = "Ramp+EM Brk" 10 = "PointStp,CF"(1) 11 = "PointStop"	0
	Stop command for normal stop. **Important:** I/O Terminal 01 is always a stop input. The stopping mode is determined by the drive setting. **Important:** The drive is shipped with a jumper installed between I/O Terminals 01 and 11. Remove this jumper when using I/O Terminal 01 as a stop or enable input. (1) Stop input also clears active fault.			
P046, P048, P050	[Start Source 1]	1/5	1 = "Keypad"(1) 2 = "DigIn TrmBlk"(2) 3 = "Serial/DSI" 4 = "Network Opt" 5 = "Ethernet/IP"(3)	P046 = 1 P048 = 2 P050 = 3 (PowerFlex 523) 5 (PowerFlex 525)
○	Sets the default control scheme used to start the drive unless overriden by P048 [Start Source 2] or P050 [Start Source 3]. (1) When active, the Reverse key is also active unless disabled by A544 [Reverse Disable]. (2) If "DigIn TrmBlk" is selected, ensure that the digital inputs are properly configured. (3) Setting is specific to PowerFlex 525 drives only.			
P047, P049, P051	[Speed Reference1]	1/16	1 = "Drive Pot" 2 = "Keypad Freq" 3 = "Serial/DSI" 4 = "Network Opt" 5 = "0-10V Input" 6 = "4-20mA Input" 7 = "Preset Freq" 8 = "Anlg In Mult"(1) 9 = "MOP" 10 = "Pulse Input" 11 = "PID1 Output" 12 = "PID2 Output"(1) 13 = "Step Logic"(1) 14 = "Encoder"(1) 15 = "Ethernet/IP"(1) 16 = "Positioning"(1)	P047 = 1 P049 = 5 P051 = 3 (PowerFlex 523) 15 (PowerFlex 525)
	Sets the default speed command of the drive unless overridden by P049 [Speed Reference2] or P051 [Speed Reference3]. (1) Setting is specific to PowerFlex 525 drives only.			
P052	[Average kWh Cost]	0.00/655.35	0.01	0.00
	Sets the average cost per kWh.			
P053	[Reset To Defalts]	0/3	0 = "Ready/Idle" 1 = "Param Reset" 2 = "Factory Rset" 3 = "Power Reset"	0
○	Resets parameters to their factory defaults values. After a Reset command, the value of this parameter returns to zero.			

LCD & Scrolling Description

Use parameter A556 [Text Scroll] to set the speed at which the text scrolls across the display. Select 0 “Off” to turn off text scrolling. See Language Support on page 64 for the languages supported by the PowerFlex 520-series drive.

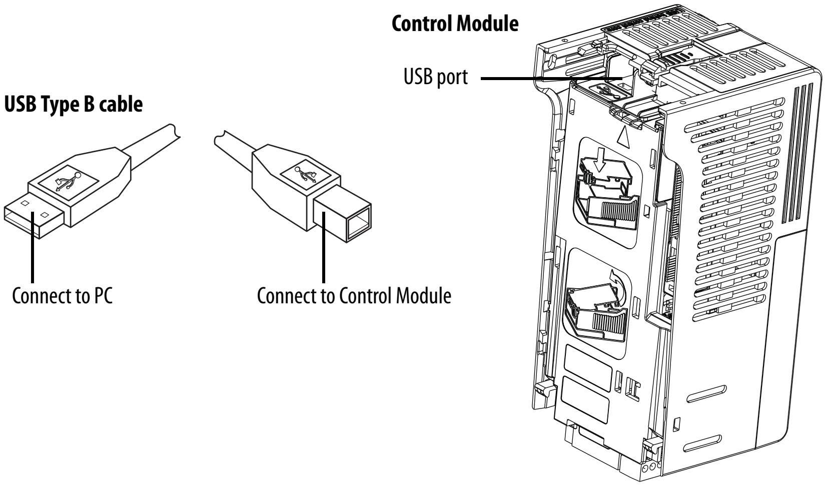
Using the USB Port

The PowerFlex 520-series drive has a USB port that connects to a PC for the purpose of upgrading drive firmware or uploading/downloading a parameter configuration.

You do not need to power up the control module. Simply connect the PowerFlex 520-series drive to your PC with a USB Type B cable, and you will benefit from MainsFree™ programming.

IMPORTANT	To use the USB feature of the PowerFlex 520-series drive, Microsoft .Net Framework 2.0 and Windows XP or later is required.

Connecting a PowerFlex 520-series drive to a PC

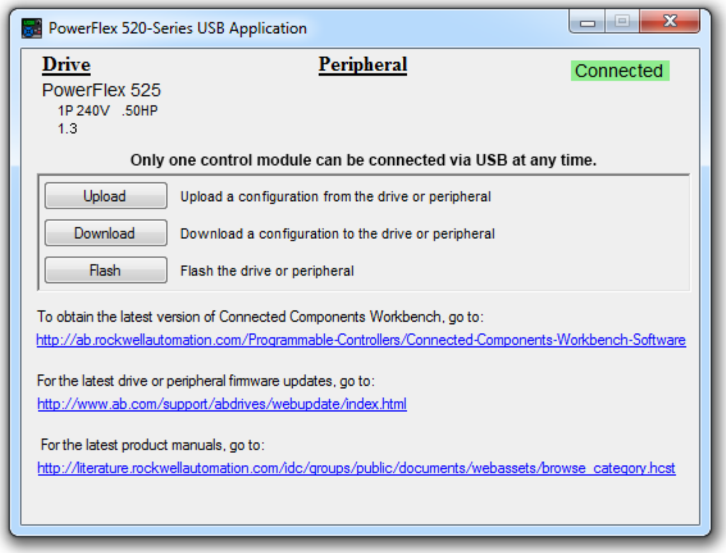


When connected, the drive appears on the PC and contains two files:

- GUIDE.PDF
  This file contains links to relevant product documentation and software downloads.
- PF52XUSB.EXE
  This file is an application to flash upgrade firmware or upload/download a parameter configuration.

  It is not possible to delete these files or add more to the drive.

Double-click on the PF52XUSB.EXE file to launch the USB utility application. The main menu is displayed. Follow the program instructions to upgrade the firmware or upload/download configuration data.



PowerFlex 525
1P 240V .50HP
1.3

Only one control module can be connected via USB at any time.

Upload a configuration from the drive or peripheral

Download a configuration to the drive or peripheral

Flash the drive or peripheral

To obtain the latest version of Connected Components Workbench, go to:
http://ab.rockwellautomation.com/Programmable-Controllers/Connected-Components-Workbench-Software

For the latest drive or peripheral firmware updates, go to:
http://www.ab.com/support/abdrives/webupdate/index.html

For the latest product manuals, go to:
http://literature.rockwellautomation.com/idc/groups/public/documents/webassets/browse_category.hcst

IMPORTANT	Make sure your PC is powered by an AC power outlet or has a fully charged battery before starting any operation. This prevents the operation from terminating before completion due to insufficient power.

Limitation in Downloading .pf5 Configuration Files with the USB Utility Application

Before downloading a .pf5 configuration file using the USB utility application, parameter C169 [MultiDrv Sel] in the destination drive must match the incoming configuration file. If it does not, set the parameter manually to match and then cycle drive power.

This means you cannot apply a multi-drive configuration using the USB utility application to a drive in single mode (parameter C169 [MultiDrv Sel] set to 0 "Disabled"), or apply a single mode configuration to a drive in multi-drive mode.

Programming and Parameters

This chapter provides a complete listing and description of the PowerFlex 520-series drive parameters. Parameters are programmed (viewed/edited) using either the drive's built-in keypad, RSLogix 5000 version 17.0 or greater, Logix Designer version 21.0 or greater, or Connected Components Workbench version 5.0 or greater software. The Connected Components Workbench software can be used offline (through USB) to upload parameter configurations to the drive or online (through Ethernet connection).

Limited functionality is also available when using the Connected Components Workbench software online (through DSI and serial converter module), a legacy external HIM, or legacy software online (DriveTools SP™). When using these methods, the parameter list can only be displayed linearly, and there is no access to communications option card programming.

For information on...	See page...
About Parameters	69
Parameter Groups	70
Basic Display Group	75
Basic Program Group	80
Terminal Block Group	85
Communications Group	97
Logic Group	103
Advanced Display Group	106
Advanced Program Group	110
Network Parameter Group	132
Modified Parameter Group	132
Fault and Diagnostic Group	133
AppView Parameter Groups	140
CustomView Parameter Group	141
Parameter Cross Reference by Name	142

About Parameters

To configure a drive to operate in a specific way, drive parameters may have to be set. Three types of parameters exist:

- **ENUM**
  ENUM parameters allow a selection from 2 or more items. Each item is represented by a number.
- **Numeric Parameters**
  These parameters have a single numerical value (0.1V).

- **Bit Parameters**
  Bit parameters have five individual digits associated with features or conditions. If the digit is 0, the feature is off or the condition is false. If the digit is 1, the feature is on or the condition is true.

Some parameters are marked as follows.

○ = Stop drive before changing this parameter.

32 = 32 bit parameter. Parameters marked 32 bit will have two parameter numbers ([Step Units x] and [Step Units F x]) when using RS485 communications and programming software. The second parameter number is shown only in the Parameter Groups and Parameter Cross Reference by Name tables for reference.

PF 525 = Parameter is specific to PowerFlex 525 drives only.

Parameter Groups

For an alphabetical listing of parameters, see Parameter Cross Reference by Name on page 142.

Basic Display		Output Voltage	b004	Control Source	b012	Elapsed Run Time	b019	Accum CO2 Sav	b026
		DC Bus Voltage	b005	Contrl In Status	b013	Average Power	b020	Drive Temp	b027
		Drive Status	b006	Dig In Status	b014	Elapsed kWh	b021	Control Temp	b028
		Fault 1 Code	b007	Output RPM	b015	Elapsed MWh	b022	Control SW Ver	b029
Output Freq	b001	Fault 2 Code	b008	Output Speed	b016	Energy Saved	b023		
Commanded Freq	b002	Fault 3 Code	b009	Output Power	b017	Accum kWh Sav	b024		
Output Current	b003	Process Display	b010	Power Saved	b018	Accum Cost Sav	b025		
Basic Program		Motor NP Hertz	P032	Voltage Class	P038	Maximum Freq	P044	Start Source 3	P050
		Motor OL Current	P033	Torque Perf Mode	P039	Stop Mode	P045	Speed Reference3	P051
		Motor NP FLA	P034	Autotune	P040	Start Source 1	P046	Average kWh Cost	P052
		Motor NP Poles	P035	Accel Time 1	P041	Speed Reference1	P047	Reset To Defalts	P053
Language	P030	Motor NP RPM	P036	Decel Time 1	P042	Start Source 2	P048		
Motor NP Volts	P031	Motor NP Power	P037	Minimum Freq	P043	Speed Reference2	P049		
Terminal Blocks		DigIn TermBlk 07(1)	t067	Relay 1 On Time	t079	Analog Out High(1)	t089	Anlg Loss Delay	t098
		DigIn TermBlk 08(1)	t068	Relay 1 Off Time	t080	Anlg Out Setpt(1)	t090	Analog In Filter	t099
		Opto Out1 Sel(1)	t069	Relay Out2 Sel(1)	t081	Anlg In 0-10V Lo	t091	Sleep-Wake Sel	t100
		Opto Out1 Level(1)	t070	Relay Out2 Level(1)	t082	Anlg In 0-10V Hi	t092	Sleep Level	t101
DigIn TermBlk 02	t062	Opto Out2 Sel(1)	t072	Relay 2 On Time(1)	t084	10V Bipolar Enbl(1)	t093	Sleep Time	t102
DigIn TermBlk 03	t063	Opto Out2 Level(1)	t073	Relay 2 Off Time(1)	t085	Anlg In V Loss	t094	Wake Level	t103
2-Wire Mode	t064	Opto Out Logic(1)	t075	EM Brk Off Delay	t086	Anlg In4-20mA Lo	t095	Wake Time	t104
DigIn TermBlk 05	t065	Relay Out1 Sel	t076	EM Brk On Delay	t087	Anlg In4-20mA Hi	t096	Safety Open En(1)	t105
DigIn TermBlk 06	t066	Relay Out1 Level	t077	Analog Out Sel(1)	t088	Anlg In mA Loss	t097		
Communications		EN Addr Sel(1)	C128	EN Gateway Cfg 3(1)	C139	EN Data In 1(1)	C153	Opt Data In 4	C164
		EN IP Addr Cfg 1(1)	C129	EN Gateway Cfg 4(1)	C140	EN Data In 2(1)	C154	Opt Data Out 1	C165
		EN IP Addr Cfg 2(1)	C130	EN Rate Cfg(1)	C141	EN Data In 3(1)	C155	Opt Data Out 2	C166
		EN IP Addr Cfg 3(1)	C131	EN Comm Flt Actn(1)	C143	EN Data In 4(1)	C156	Opt Data Out 3	C167
Comm Write Mode	C121	EN IP Addr Cfg 4(1)	C132	EN Idle Flt Actn(1)	C144	EN Data Out 1(1)	C157	Opt Data Out 4	C168
Cmd Stat Select(1)	C122	EN Subnet Cfg 1(1)	C133	EN Flt Cfg Logic(1)	C145	EN Data Out 2(1)	C158	MultiDrv Sel	C169
RS485 Data Rate	C123	EN Subnet Cfg 2(1)	C134	EN Flt Cfg Ref(1)	C146	EN Data Out 3(1)	C159	Drv 1 Addr	C171
RS485 Node Addr	C124	EN Subnet Cfg 3(1)	C135	EN Flt Cfg DL 1(1)	C147	EN Data Out 4(1)	C160	Drv 2 Addr	C172
Comm Loss Action	C125	EN Subnet Cfg 4(1)	C136	EN Flt Cfg DL 2(1)	C148	Opt Data In 1	C161	Drv 3 Addr	C173
Comm Loss Time	C126	EN Gateway Cfg 1(1)	C137	EN Flt Cfg DL 3(1)	C149	Opt Data In 2	C162	Drv 4 Addr	C174
RS485 Format	C127	EN Gateway Cfg 2(1)	C138	EN Flt Cfg DL 4(1)	C150	Opt Data In 3	C163	DSI I/O Cfg	C175

(1) Parameter is specific to PowerFlex 525 drives only.

Logic(1)

Stp Logic 0	L180
Stp Logic 1	L181
Stp Logic 2	L182
Stp Logic 3	L183
Stp Logic 4	L184
Stp Logic 5	L185
Stp Logic 6	L186
Stp Logic 7	L187
Stp Logic Time 0	L190
Stp Logic Time 1	L191
Stp Logic Time 2	L192
Stp Logic Time 3	L193
Stp Logic Time 4	L194
Stp Logic Time 5	L195
Stp Logic Time 6	L196
Stp Logic Time 7	L197
Step Units 0	L200
Step Units 1	L202
Step Units 2	L204
Step Units 3	L206
Step Units 4	L208
Step Units 5	L210
Step Units 6	L212
Step Units 7	L214

Advanced Display

Analog In 0-10V	d360
Analog In 4-20mA	d361
Elapsed Time-hr	d362
Elapsed Time-min	d363
Counter Status	d364
Timer Status	d365
Drive Type	d367
Testpoint Data	d368
Motor OL Level	d369
Slip Hz Meter	d375
Speed Feedback	d376
Encoder Speed(1)	d378
DC Bus Ripple	d380
Output Powr Fctr	d381
Torque Current	d382
PID1 Fdbk Displ	d383
PID1 Setpnt Displ	d384
PID2 Fdbk Displ	d385
PID2 Setpnt Displ	d386
Position Status	d387
Units Traveled H(1)	d388
Units Traveled L(1)	d389
Fiber Status	d390
Stp Logic Status(1)	d391

Advanced Program

Preset Freq 0	A410
Preset Freq 1	A411
Preset Freq 2	A412
Preset Freq 3	A413
Preset Freq 4	A414
Preset Freq 5	A415
Preset Freq 6	A416
Preset Freq 7	A417
Preset Freq 8(1)	A418
Preset Freq 9(1)	A419
Preset Freq 10(1)	A420
Preset Freq 11(1)	A421
Preset Freq 12(1)	A422
Preset Freq 13(1)	A423
Preset Freq 14(1)	A424
Preset Freq 15(1)	A425
Keypad Freq	A426
MOP Freq	A427
MOP Reset Sel	A428
MOP Preload	A429
MOP Time	A430
Jog Frequency	A431
Jog Accel/Decel	A432
Purge Frequency	A433
DC Brake Time	A434
DC Brake Level	A435
DC Brk Time@Strt	A436
DB Resistor Sel	A437
DB Threshold	A438
S Curve %	A439
PWM Frequency	A440
Droop Hertz@ FLA(1)	A441
Accel Time 2	A442
Decel Time 2	A443
Accel Time 3	A444
Decel Time 3	A445
Accel Time 4	A446
Decel Time 4	A447
Skip Frequency 1	A448
Skip Freq Band 1	A449
Skip Frequency 2	A450
Skip Freq Band 2	A451
Skip Frequency 3(1)	A452
Skip Freq Band 3(1)	A453
Skip Frequency 4(1)	A454
Skip Freq Band 4(1)	A455
PID 1 Trim Hi	A456
PID 1 Trim Lo	A457
PID 1 Trim Sel	A458
PID 1 Ref Sel	A459
PID 1 Fdback Sel	A460
PID 1 Prop Gain	A461
PID 1 Integ Time	A462
PID 1 Diff Rate	A463
PID 1 Setpoint	A464
PID 1 Deadband	A465
PID 1 Preload	A466
PID 1 Invert Err	A467
PID 2 Trim Hi(1)	A468
PID 2 Trim Lo(1)	A469
PID 2 Trim Sel(1)	A470
PID 2 Ref Sel(1)	A471
PID 2 Fdback Sel(1)	A472
PID 2 Prop Gain(1)	A473
PID 2 Integ Time(1)	A474
PID 2 Diff Rate(1)	A475
PID 2 Setpoint(1)	A476
PID 2 Deadband(1)	A477
PID 2 Preload(1)	A478
PID 2 Invert Err(1)	A479
Process Disp Lo	A481
Process Disp Hi	A482
Testpoint Sel	A483
Current Limit 1	A484
Current Limit 2(1)	A485
Shear Pin1 Level	A486
Shear Pin 1 Time	A487
Shear Pin2 Level(1)	A488
Shear Pin 2 Time(1)	A489
Load Loss Level(1)	A490
Load Loss Time(1)	A491
Stall Fault Time	A492
Motor OL Select	A493
Motor OL Ret	A494
Drive OL Mode	A495
IR Voltage Drop	A496
Flux Current Ref	A497
Motor Rr(1)	A498
Motor Lm(1)	A499
Motor Lx(1)	A500
Speed Reg Sel	A509
Freq 1	A510
Freq 1 BW	A511
Freq 2	A512
Freq 2 BW	A513
Freq 3	A514
Freq 3 BW	A515
Freq 1 Kp	A521
Freq 1 Ki	A522
Freq 2 Kp	A523
Freq 2 Ki	A524
Freq 3 Kp	A525
Freq 3 Ki	A526
Boost Select	A530
Start Boost	A531
Break Voltage	A532
Break Frequency	A533
Maximum Voltage	A534
Motor Fdbk Type(1)	A535
Encoder PPR(1)	A536
Pulse In Scale	A537
Ki Speed Loop(1)	A538
Kp Speed Loop(1)	A539
Var PWM Disable	A540
Auto Rstrt Tries	A541
Auto Rstrt Delay	A542
Start At PowerUp	A543
Reverse Disable	A544
Flying Start En	A545
FlyStrt CurLimit	A546
Compensation	A547
Power Loss Mode	A548
Half Bus Enable	A549
Bus Reg Enable	A550
Fault Clear	A551
Program Lock	A552
Program Lock Mod	A553
Drv Ambient Sel	A554
Reset Meters	A555
Text Scroll	A556
Out Phas Loss En	A557
Positioning Mode(1)	A558
Counts Per Unit(1)	A559
Enh Control Word(1)	A560
Home Save(1)	A561
Find Home Freq(1)	A562
Find Home Dir(1)	A563
Encoder Pos Tol(1)	A564
Pos Reg Filter(1)	A565
Pos Reg Gain(1)	A566
Max Traverse	A567
Traverse Inc	A568
Traverse Dec	A569
P Jump	A570
Sync Time	A571
Speed Ratio	A572

Network

This group contains parameters for the network option card that is installed.
See the network option card's user manual for more information on the available parameters.

Modified

This group contains parameters that have their values changed from the factory default.
When a parameter has its default value changed, it is automatically added to this group. When a parameter has its value changed back to the factory default, it is automatically removed from this group.

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(1) Parameter is specific to PowerFlex 525 drives only.

Fault and Diagnostic

Fault 4 Code	F604
Fault 5 Code	F605
Fault 6 Code	F606
Fault 7 Code	F607
Fault 8 Code	F608
Fault 9 Code	F609
Fault10 Code	F610
Fault 1 Time-hr	F611
Fault 2 Time-hr	F612
Fault 3 Time-hr	F613
Fault 4 Time-hr	F614
Fault 5 Time-hr	F615
Fault 6 Time-hr(1)	F616
Fault 7 Time-hr(1)	F617
Fault 8 Time-hr(1)	F618
Fault 9 Time-hr(1)	F619
Fault10 Time-hr(1)	F620
Fault 1 Time-min	F621
Fault 2 Time-min	F622
Fault 3 Time-min	F623
Fault 4 Time-min	F624
Fault 5 Time-min	F625
Fault 6 Time-min(1)	F626
Fault 7 Time-min(1)	F627
Fault 8 Time-min(1)	F628
Fault 9 Time-min(1)	F629
Fault10 Time-min(1)	F630
Fault 1 Freq	F631
Fault 2 Freq	F632
Fault 3 Freq	F633
Fault 4 Freq	F634
Fault 5 Freq	F635
Fault 6 Freq(1)	F636
Fault 7 Freq(1)	F637
Fault 8 Freq(1)	F638
Fault 9 Freq(1)	F639
Fault10 Freq(1)	F640
Fault 1 Current	F641
Fault 2 Current	F642
Fault 3 Current	F643
Fault 4 Current	F644
Fault 5 Current	F645
Fault 6 Current(1)	F646
Fault 7 Current(1)	F647
Fault 8 Current(1)	F648
Fault 9 Current(1)	F649
Fault10 Current(1)	F650
Fault 1 BusVolts	F651
Fault 2 BusVolts	F652
Fault 3 BusVolts	F653
Fault 4 BusVolts	F654
Fault 5 BusVolts	F655
Fault 6 BusVolts(1)	F656
Fault 7 BusVolts(1)	F657
Fault 8 BusVolts(1)	F658
Fault 9 BusVolts(1)	F659
Fault10 BusVolts(1)	F660
Status @ Fault 1	F661
Status @ Fault 2	F662
Status @ Fault 3	F663
Status @ Fault 4	F664
Status @ Fault 5	F665
Status @ Fault 6(1)	F666
Status @ Fault 7(1)	F667
Status @ Fault 8(1)	F668
Status @ Fault 9(1)	F669
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Comm Sts - DSI	F681
Comm Sts - Opt	F682
Com Sts-Emb Enet(1)	F683
EN Addr Src(1)	F684
EN Rate Act(1)	F685
DSI I/O Act	F686
HW Addr 1(1)	F687
HW Addr 2(1)	F688
HW Addr 3(1)	F689
HW Addr 4(1)	F690
HW Addr 5(1)	F691
HW Addr 6(1)	F692
EN IP Addr Act 1(1)	F693
EN IP Addr Act 2(1)	F694
EN IP Addr Act 3(1)	F695
EN IP Addr Act 4(1)	F696
EN Subnet Act 1(1)	F697
EN Subnet Act 2(1)	F698
EN Subnet Act 3(1)	F699
EN Subnet Act 4(1)	F700
EN Gateway Act 1(1)	F701
EN Gateway Act 2(1)	F702
EN Gateway Act 3(1)	F703
EN Gateway Act 4(1)	F704
Drv 0 Logic Cmd	F705
Drv 0 Reference	F706
Drv 0 Logic Sts	F707
Drv 0 Feedback	F708
Drv 1 Logic Cmd	F709
Drv 1 Reference	F710
Drv 1 Logic Sts	F711
Drv 1 Feedback	F712
Drv 2 Logic Cmd	F713
Drv 2 Reference	F714
Drv 2 Logic Sts	F715
Drv 2 Feedback	F716
Drv 3 Logic Cmd	F717
Drv 3 Reference	F718
Drv 3 Logic Sts	F719
Drv 3 Feedback	F720
Drv 4 Logic Cmd	F721
Drv 4 Reference	F722
Drv 4 Logic Sts	F723
Drv 4 Feedback	F724
EN Rx Overruns(1)	F725
EN Rx Packets(1)	F726
EN Rx Errors(1)	F727
EN Tx Packets(1)	F728
EN Tx Errors(1)	F729
EN Missed IO Pkt(1)	F730
DSI Errors	F731

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(1) Parameter is specific to PowerFlex 525 drives only.

AppView Parameter Groups

PowerFlex 520-series drives include various AppView™ parameter groups that groups certain parameters together for quick and easy access based on different types of applications. See AppView Parameter Groups on page 140 for more information.

Conveyor

Language	P030
Output Freq	b001
Commanded Freq	b002
Motor NP Volts	P031
Motor NP Hertz	P032
Motor OL Current	P033
Motor NP FLA	P034
Motor NP Poles	P035
Autotune	P040
Accel Time 1	P041
Decel Time 1	P042
Minimum Freq	P043
Maximum Freq	P044
Stop Mode	P045
Start Source 1	P046
Speed Reference1	P047
DigIn TermBlk 02	t062
DigIn TermBlk 03	t063
Opto Out1 Sel	t069
Relay Out1 Sel	t076
Anlg In 0-10V Lo	t091
Anlg In 0-10V Hi	t092
Anlg In4-20mA Lo	t095
Anlg In4-20mA Hi	t096
Anlg In mA Loss	t097
Slip Hz Meter	d375
Preset Freq 0	A410
Jog Frequency	A431
Jog Accel/Decel	A432
S Curve %	A439
Reverse Disable	A544

Mixer

Language	P030
Output Freq	b001
Commanded Freq	b002
Output Current	b003
Motor NP Volts	P031
Motor NP Hertz	P032
Motor OL Current	P033
Motor NP FLA	P034
Motor NP Poles	P035
Autotune	P040
Accel Time 1	P041
Decel Time 1	P042
Minimum Freq	P043
Maximum Freq	P044
Stop Mode	P045
Start Source 1	P046
Speed Reference1	P047
Relay Out1 Sel	t076
Anlg In 0-10V Lo	t091
Anlg In 0-10V Hi	t092
Anlg In4-20mA Lo	t095
Anlg In4-20mA Hi	t096
Anlg In mA Loss	t097
Preset Freq 0	A410
Stall Fault Time	A492

Compressor

Language	P030
Output Freq	b001
Commanded Freq	b002
Motor NP Volts	P031
Motor NP Hertz	P032
Motor OL Current	P033
Motor NP FLA	P034
Motor NP Poles	P035
Autotune	P040
Accel Time 1	P041
Decel Time 1	P042
Minimum Freq	P043
Maximum Freq	P044
Stop Mode	P045
Start Source 1	P046
Speed Reference1	P047
Relay Out1 Sel	t076
Analog Out Sel	t088
Analog Out High	t089
Anlg Out Setpt	t090
Anlg In 0-10V Lo	t091
Anlg In 0-10V Hi	t092
Anlg In4-20mA Lo	t095
Anlg In4-20mA Hi	t096
Anlg In mA Loss	t097
Preset Freq 0	A410
Auto Rstrt Tries	A541
Auto Rstrt Delay	A542
Start At PowerUp	A543
Reverse Disable	A544
Power Loss Mode	A548
Half Bus Enable	A549

Centrifugal Pump		Motor OL Current	P033	Start Source 1	P046	Anlg In4-20mA Hi	t096	PID 1 Diff Rate	A463
G4		Motor NP FLA	P034	Speed Reference1	P047	Anlg In mA Loss	t097	PID 1 Setpoint	A464
		Motor NP Poles	P035	Relay Out1 Sel	t076	Preset Freq 0	A410	PID 1 Deadband	A465
		Autotune	P040	Analog Out Sel	t088	PID 1 Trim Hi	A456	PID 1 Preload	A466
Language	P030	Accel Time 1	P041	Analog Out High	t089	PID 1 Trim Lo	A457	Auto Rstrt Tries	A541
Output Freq	b001	Decel Time 1	P042	Anlg Out Setpt	t090	PID 1 Ref Sel	A459	Auto Rstrt Delay	A542
Commanded Freq	b002	Minimum Freq	P043	Anlg In 0-10V Lo	t091	PID 1 Fdback Sel	A460	Start At PowerUp	A543
Motor NP Volts	P031	Maximum Freq	P044	Anlg In 0-10V Hi	t092	PID 1 Prop Gain	A461	Reverse Disable	A544
Motor NP Hertz	P032	Stop Mode	P045	Anlg In4-20mA Lo	t095	PID 1 Integ Time	A462		
Blower/Fan		Motor OL Current	P033	Start Source 1	P046	Anlg In4-20mA Hi	t096	PID 1 Diff Rate	A463
G5		Motor NP FLA	P034	Speed Reference1	P047	Anlg In mA Loss	t097	PID 1 Setpoint	A464
		Motor NP Poles	P035	Relay Out1 Sel	t076	Preset Freq 0	A410	PID 1 Deadband	A465
		Autotune	P040	Analog Out Sel	t088	PID 1 Trim Hi	A456	PID 1 Preload	A466
Language	P030	Accel Time 1	P041	Analog Out High	t089	PID 1 Trim Lo	A457	Auto Rstrt Tries	A541
Output Freq	b001	Decel Time 1	P042	Anlg Out Setpt	t090	PID 1 Ref Sel	A459	Auto Rstrt Delay	A542
Commanded Freq	b002	Minimum Freq	P043	Anlg In 0-10V Lo	t091	PID 1 Fdback Sel	A460	Start At PowerUp	A543
Motor NP Volts	P031	Maximum Freq	P044	Anlg In 0-10V Hi	t092	PID 1 Prop Gain	A461	Reverse Disable	A544
Motor NP Hertz	P032	Stop Mode	P045	Anlg In4-20mA Lo	t095	PID 1 Integ Time	A462	Flying Start En	A545
Extruder		Motor NP Hertz	P032	Stop Mode	P045	Anlg In4-20mA Lo	t095	Encoder PPR	A536
G6		Motor OL Current	P033	Start Source 1	P046	Anlg In4-20mA Hi	t096	Pulse In Scale	A537
		Motor NP FLA	P034	Speed Reference1	P047	Anlg In mA Loss	t097	Ki Speed Loop	A538
		Motor NP Poles	P035	Relay Out1 Sel	t076	Slip Hz Meter	d375	Kp Speed Loop	A539
Language	P030	Autotune	P040	Analog Out Sel	t088	Speed Feedback	d376	Power Loss Mode	A548
Output Freq	b001	Accel Time 1	P041	Analog Out High	t089	Encoder Speed	d378	Half Bus Enable	A549
Commanded Freq	b002	Decel Time 1	P042	Anlg Out Setpt	t090	Preset Freq 0	A410		
Output Current	b003	Minimum Freq	P043	Anlg In 0-10V Lo	t091	Stall Fault Time	A492		
Motor NP Volts	P031	Maximum Freq	P044	Anlg In 0-10V Hi	t092	Motor Fdbk Type	A535		
Positioning(1)		Stop Mode	P045	Stp Logic 5	L185	Step Units 6	L212	Jog Accel/Decel	A432
G7		Start Source 1	P046	Stp Logic 6	L186	Step Units 7	L214	DB Threshold	A438
		Speed Reference1	P047	Stp Logic 7	L187	Slip Hz Meter	d375	S Curve %	A439
		DigIn TermBlk 02	t062	Stp Logic Time 0	L190	Speed Feedback	d376	Motor Fdbk Type	A535
Language	P030	DigIn TermBlk 03	t063	Stp Logic Time 1	L191	Encoder Speed	d378	Encoder PPR	A536
Output Freq	b001	DigIn TermBlk 05	t065	Stp Logic Time 2	L192	Units Traveled H	d388	Pulse In Scale	A537
Commanded Freq	b002	DigIn TermBlk 06	t066	Stp Logic Time 3	L193	Units Traveled L	d389	Ki Speed Loop	A538
Motor NP Volts	P031	Opto Out1 Sel	t069	Stp Logic Time 4	L194	Preset Freq 0	A410	Kp Speed Loop	A539
Motor NP Hertz	P032	Opto Out2 Sel	t072	Stp Logic Time 5	L195	Preset Freq 1	A411	Bus Reg Enable	A550
Motor OL Current	P033	Relay Out1 Sel	t076	Stp Logic Time 6	L196	Preset Freq 2	A412	Positioning Mode	A558
Motor NP FLA	P034	EM Brk Off Delay	t086	Stp Logic Time 7	L197	Preset Freq 3	A413	Counts Per Unit	A559
Motor NP Poles	P035	EM Brk On Delay	t087	Step Units 0	L200	Preset Freq 4	A414	Enh Control Word	A560
Autotune	P040	Stp Logic 0	L180	Step Units 1	L202	Preset Freq 5	A415	Find Home Freq	A562
Accel Time 1	P041	Stp Logic 1	L181	Step Units 2	L204	Preset Freq 6	A416	Find Home Dir	A563
Decel Time 1	P042	Stp Logic 2	L182	Step Units 3	L206	Preset Freq 7	A417	Encoder Pos Tol	A564
Minimum Freq	P043	Stp Logic 3	L183	Step Units 4	L208	Preset Freq 8	A418	Pos Reg Filter	A565
Maximum Freq	P044	Stp Logic 4	L184	Step Units 5	L210	Jog Frequency	A431	Pos Reg Gain	A566
Textile/Fiber		Motor NP FLA	P034	DigIn TermBlk 02	t062	Slip Hz Meter	d375	Max Traverse	A567
G8		Motor NP Poles	P035	DigIn TermBlk 03	t063	Fiber Status	d390	Traverse Inc	A568
		Autotune	P040	Opto Out1 Sel	t069	Preset Freq 0	A410	Traverse Dec	A569
		Accel Time 1	P041	Opto Out2 Sel	t072	Jog Frequency	A431	P Jump	A570
Language	P030	Decel Time 1	P042	Relay Out1 Sel	t076	Jog Accel/Decel	A432	Sync Time	A571
Output Freq	b001	Minimum Freq	P043	Anlg In 0-10V Lo	t091	S Curve %	A439	Speed Ratio	A572
Commanded Freq	b002	Maximum Freq	P044	Anlg In 0-10V Hi	t092	Reverse Disable	A544		
Motor NP Volts	P031	Stop Mode	P045	Anlg In4-20mA Lo	t095	Power Loss Mode	A548		
Motor NP Hertz	P032	Start Source 1	P046	Anlg In4-20mA Hi	t096	Half Bus Enable	A549		
Motor OL Current	P033	Speed Reference1	P047	Anlg In mA Loss	t097	Bus Reg Enable	A550		

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(1) This AppView parameter group is specific to PowerFlex 525 drives only.

CustomView Parameter Group

PowerFlex 520-series drives include a CustomView™ parameter group for you to store frequently used parameters for your application. See CustomView Parameter Group on page 141 for more information.

Custom Group

GC

This group can store up to 100 parameters.

Basic Display Group

b001 [Output Freq]

Related Parameter(s): b002, b010, P043, P044, P048, P050, P052

Output frequency present at T1, T2 & T3 (U, V & W). Does not include slip frequency.

Values	Default:	Read Only
	Min/Max:	0.00/[Maximum Freq]
	Display:	0.01 Hz

b002 [Commanded Freq]

Related Parameter(s): b001, b013, P043, P044, P048, P050, P052

Value of the active frequency command even if the drive is not running.

IMPORTANT The frequency command can come from a number of sources. See Start and Speed Reference Control on page 49 for more information.

Values	Default:	Read Only
	Min/Max:	0.00/[Maximum Freq]
	Display:	0.01 Hz

b003 [Output Current]

Output current present at T1, T2 & T3 (U, V & W).

Values	Default:	Read Only
	Min/Max:	0.00/(Drive Rated Amps x 2)
	Display:	0.01 A

b004 [Output Voltage]

Related Parameter(s): P031, A530, A534

Output voltage present at T1, T2 & T3 (U, V & W).

Values	Default:	Read Only
	Min/Max:	0.0/Drive Rated Volts
	Display:	0.1V

b005 [DC Bus Voltage]

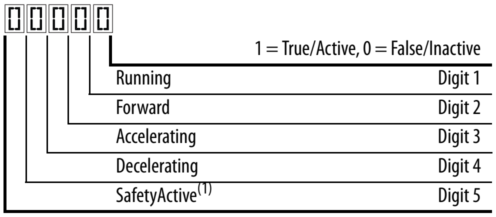
Filtered DC bus voltage level of the drive.

Values	Default:	Read Only
	Min/Max:	0/1200VDC
	Display:	1VDC

b006 [Drive Status]

Related Parameter(s): A544

Present operating condition of the drive.



	1 = True/Active, 0 = False/Inactive
Running	Digit 1
Forward	Digit 2
Accelerating	Digit 3
Decelerating	Digit 4
SafetyActive(1)	Digit 5

(1) Setting is specific to PowerFlex 525 drives only.

Values	Default:	Read Only
	Min/Max:	00000/11111
	Display:	00000

Basic Display Group *(continued)*

b007 [Fault 1 Code]
b008 [Fault 2 Code]
b009 [Fault 3 Code]

Related Parameter(s): F604-F610

A code that represents a drive fault. Codes appear in these parameters in the order they occur (b007 [Fault 1 Code] = the most recent fault). Repetitive faults are only recorded once. See Fault and Diagnostic Group for more information.

Values	Default:	Read Only
	Min/Max:	F0/F127
	Display:	F0

b010 [Process Display]

Related Parameter(s): b001, A481, A482

32 32 bit parameter.

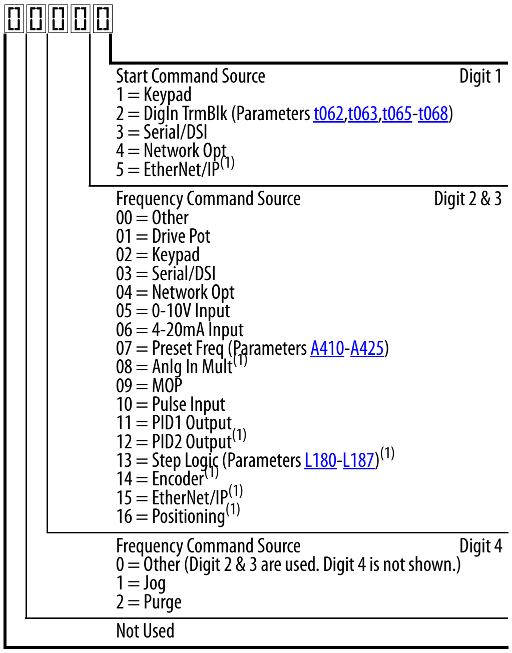
Output frequency scaled by [Process Disp Hi] and [Process Disp Lo].

Values	Default:	Read Only
	Min/Max:	0/9999
	Display:	1

b012 [Control Source]

Related Parameter(s): P046, P047, P048, P049, P050, P051, t062, t063, t065-t068, L180-L187, A410-A425

Active source of the Start Command and Frequency Command. Normally defined by the settings of P046, P048, P050 [Start Source x] and P047, P049, P051 [Speed Referencex]. See Start and Speed Reference Control on page 49 for more information.



Start Command Source — Digit 1
1 = Keypad
2 = DigIn TrmBlk (Parameters t062,t063,t065-t068)
3 = Serial/DSI
4 = Network Opt
5 = EtherNet/IP(1)

Frequency Command Source — Digit 2 & 3
00 = Other
01 = Drive Pot
02 = Keypad
03 = Serial/DSI
04 = Network Opt
05 = 0-10V Input
06 = 4-20mA Input
07 = Preset Freq (Parameters A410-A425)
08 = Anlg In Mult(1)
09 = MOP
10 = Pulse Input
11 = PID1 Output
12 = PID2 Output(1)
13 = Step Logic (Parameters L180-L187)(1)
14 = Encoder(1)
15 = EtherNet/IP(1)
16 = Positioning(1)

Frequency Command Source — Digit 4
0 = Other (Digit 2 & 3 are used. Digit 4 is not shown.)
1 = Jog
2 = Purge

Not Used

Example

Display reads...	Description
2004	Start source comes from Network Opt and Frequency source is Purge.
113	Start source comes from Serial/DSI and Frequency source comes from PID1 Output.
155	Start source and Frequency source comes from EtherNet/IP.
052	Start source comes from DigIn TrmBlk and Frequency source from 0-10V Input.
011	Start source comes from Keypad and Frequency source comes from Drive Pot.

(1) Setting is specific to PowerFlex 525 drives only.

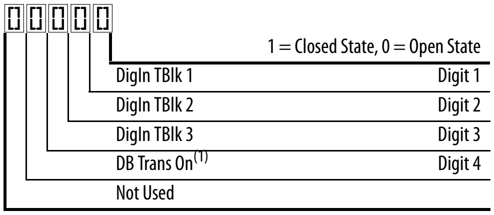
Values	Default:	Read Only
	Min/Max:	0000/2165
	Display:	0000

Basic Display Group *(continued)*

b013 [Contrl In Status] Related Parameter(s): b002, P044, P045

State of the digital terminal blocks 1…3 and DB transistor.

IMPORTANT Actual control commands may come from a source other than the control terminal block.



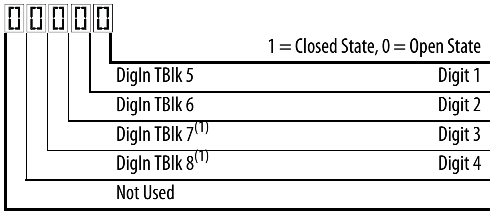
	1 = Closed State, 0 = Open State
DigIn TBlk 1	Digit 1
DigIn TBlk 2	Digit 2
DigIn TBlk 3	Digit 3
DB Trans On[1]	Digit 4
Not Used	

[1] The DB Transistor "on" indication must have a 0.5 s hysteresis. It will turn on and stay on for at least 0.5 s every time the DB transistor is turned on.

Values	Default:	Read Only
	Min/Max:	0000/1111
	Display:	0000

b014 [Dig In Status] Related Parameter(s): t065-t068

State of the programmable digital inputs.



	1 = Closed State, 0 = Open State
DigIn TBlk 5	Digit 1
DigIn TBlk 6	Digit 2
DigIn TBlk 7[1]	Digit 3
DigIn TBlk 8[1]	Digit 4
Not Used	

[1] Setting is specific to PowerFlex 525 drives only.

Values	Default:	Read Only
	Min/Max:	0000/1111
	Display:	0000

b015 [Output RPM] Related Parameter(s): P035

Current output frequency in rpm. Scale is based on P035 [Motor NP Poles].

Values	Default:	Read Only
	Min/Max:	0/24000 rpm
	Display:	1 rpm

b016 [Output Speed] Related Parameter(s): P044

Current output frequency in %. Scale is 0% at 0.00 Hz to 100% at P044 [Maximum Freq].

Values	Default:	Read Only
	Min/Max:	0.0/100.0%
	Display:	0.1%

b017 [Output Power] Related Parameter(s): b018

Output power present at T1, T2 & T3 (U, V & W).

Values	Default:	Read Only
	Min/Max:	0.00/(Drive Rated Power x 2)
	Display:	0.01 kW

Basic Display Group *(continued)*

b018 [Power Saved] Related Parameter(s): b017

Instantaneous power savings of using this drive compared to an across the line starter.

Values	Default:	Read Only
	Min/Max:	0.00/655.35 kW
	Display:	0.01 kW

b019 [Elapsed Run time] Related Parameter(s): A555

Accumulated time drive is outputting power. Time is displayed in 10 hour increments.

Values	Default:	Read Only
	Min/Max:	0/65535 x 10 hr
	Display:	1 = 10 hr

b020 [Average Power] Related Parameter(s): A555

Average power used by the motor since the last reset of the meters.

Values	Default:	Read Only
	Min/Max:	0.00/(Drive Rated Power x 2)
	Display:	0.01 kW

b021 [Elapsed kWh] Related Parameter(s): b022

Accumulated output energy of the drive. When the maximum value of this parameter is reached, it resets to zero and b022 [Elapsed MWh] is incremented.

Values	Default:	Read Only
	Min/Max:	0.0/100.0 kWh
	Display:	0.1 kWh

b022 [Elapsed MWh] Related Parameter(s): b021

Accumulated output energy of the drive.

Values	Default:	Read Only
	Min/Max:	0.0/6553.5 MWh
	Display:	0.1 MWh

b023 [Energy Saved] Related Parameter(s): A555

Total energy savings of using this drive compared to an across the line starter since the last reset of the meters.

Values	Default:	Read Only
	Min/Max:	0.0/6553.5 kWh
	Display:	0.1 kWh

b024 [Accum kWh Sav] Related Parameter(s): b025

Total approximate accumulated energy savings of the drive compared to using an across the line starter.

Values	Default:	Read Only
	Min/Max:	0.0/6553.5 kWh
	Display:	0.1 = 10 kWh

Basic Display Group *(continued)*

b025 [Accum Cost Sav] Related Parameter(s): b024, P052, A555

Total approximate accumulated cost savings of the drive compared to using an across the line starter.
[Accum Cost Sav] = [Average kWh cost] x [Accum kWh Sav]

Values	Default:	Read Only
	Min/Max:	0.0/6553.5
	Display:	0.1

b026 [Accum CO2 Sav] Related Parameter(s): A555

Total approximate accumulated CO2 savings of the drive compared to using an across the line starter.

Values	Default:	Read Only
	Min/Max:	0.0/6553.5 kg
	Display:	0.1 kg

b027 [Drive Temp]

Present operating temperature of the drive heatsink (inside module).

Values	Default:	Read Only
	Min/Max:	0/120 °C
	Display:	1 °C

b028 [Control Temp]

Present operating temperature of the drive control.

Values	Default:	Read Only
	Min/Max:	0/120 °C
	Display:	1 °C

b029 [Control SW Ver]

Current drive firmware version.

Values	Default:	Read Only
	Min/Max:	0.000/65.535
	Display:	0.001

Basic Program Group

P030 [Language]

Selects the language displayed. A reset or power cycle is required after selection is made.

				Language Support		
				Keypad/ LCD Display	RSLogix 5000/ Logix Designer	Connected Components Workbench
Options	1	English (Default)		Y	Y	Y
	2	Français		Y	Y	Y
	3	Español		Y	Y	Y
	4	Italiano		Y	Y	Y
	5	Deutsch		Y	Y	Y
	6	Japanese		–	Y	–
	7	Português		Y	Y	–
	8	Chinese	Chinese Simplified	–	Y	Y
	9	Reserved				
	10	Reserved				
	11	Korean		–	Y	–
	12	Polish(1)		Y	–	–
	13	Reserved				
	14	Turkish(1)		Y	–	–
	15	Czech(1)		Y	–	–

(1) Due to a limitation of the LCD Display, some of the characters for Polish, Turkish, and Czech will be modified.

P031 [Motor NP Volts] Related Parameter(s): b004, A530, A531, A532, A533

Stop drive before changing this parameter.

Sets the motor nameplate rated volts.

Values	Default:	Drive Rated Volts
	Min/Max:	10V (for 230V Drives), 20V (for 460V Drives), 25V (for 600V Drives)/Drive Rated Volts
	Display:	1V

P032 [Motor NP Hertz] Related Parameter(s): A493, A530, A531, A532, A533

Stop drive before changing this parameter.

Sets the motor nameplate rated frequency.

Values	Default:	60 Hz
	Min/Max:	15/500 Hz
	Display:	1 Hz

P033 [Motor OL Current] Related Parameter(s): t069, t072, t076, t081, A484, A485, A493

Sets the motor nameplate overload current. Used to determine motor overload conditions and can be set from 0.1 A to 200% of drive rated current.

IMPORTANT The drive will fault on an F007 “Motor Overload” if the value of this parameter is exceeded by 150% for 60 s.

Values	Default:	Drive Rated Amps
	Min/Max:	0.0/(Drive Rated Amps x 2)
	Display:	0.1 A

Basic Program Group *(continued)*

P034 [Motor NP FLA] Related Parameter(s): P040

Sets the motor nameplate FLA. Used to assist the Autotune routine and motor control.

Values	Default:	Based on Drive Rating
	Min/Max:	0.1/(Drive Rated Amps x 2)
	Display:	0.1 A

P035 [Motor NP Poles] Related Parameter(s): b015

Sets the number of poles in the motor.

Values	Default:	4
	Min/Max:	2/40
	Display:	1

P036 [Motor NP RPM]

Stop drive before changing this parameter.

Sets the rated nameplate rpm of the motor. Used to calculate the rated slip of the motor. To reduce the slip frequency, set this parameter closer to the motor synchronous speed.

Values	Default:	1750 rpm
	Min/Max:	0/24000 rpm
	Display:	1 rpm

P037 [Motor NP Power]

PF 525 PowerFlex 525 only.

Sets the motor nameplate power. Used in PM regulator.

Values	Default:	Drive Rated Power
	Min/Max:	0.00/Drive Rated Power
	Display:	0.01 kW

P038 [Voltage Class]

Stop drive before changing this parameter.

Sets the voltage class of 600V drives. Only applicable to 600V drives.

Options	2	"480V"
	3	"600V" (Default)

P039 [Torque Perf Mode] Related Parameter(s): P040, A530, A531, A532, A533

Stop drive before changing this parameter.

Selects the motor control mode.

Options	0	"V/Hz"
	1	"SVC" (Default)
	2	"Economize"
	3	"Vector"(1)

(1) Setting is specific to PowerFlex 525 drives only.

Basic Program Group *(continued)*

P040 [Autotune] Related Parameter(s): P034, P039, A496, A497

Stop drive before changing this parameter.

Enables a static (not spinning) or dynamic (motor spinning) autotune to automatically set the motor parameters. Start must be pressed to begin the routine. After the routine is complete the parameter resets to a zero. A failure (such as if a motor is not connected) results in an Autotune Fault.

IMPORTANT All motor parameters in the Basic Program group must be set before running the routine. If a start command is not given (or a stop command is given) within 30 s, the parameter automatically returns to a zero and an Autotune Fault occurs.

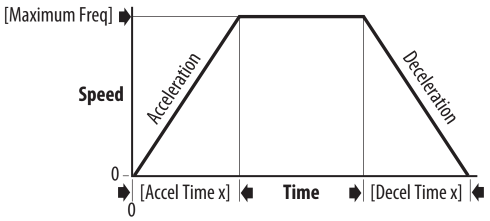
ATTENTION: Rotation of the motor in an undesired direction can occur during this procedure. To guard against possible injury and/or equipment damage, it is recommended that the motor be disconnected from the load before proceeding.

Options	0	"Ready/Idle" (Default)	
	1	"Static Tune"	Static Autotune runs at next start command.
	2	"Rotate Tune"	Static + Dynamic Autotune runs at next start command. Use Rotate Tune for best performance.

P041 [Accel Time 1] Related Parameter(s): P044, A439

Sets the time for the drive to accelerate from 0 Hz to P044 [Maximum Freq].

Accel Rate = [Maximum Freq] / [Accel Time x]

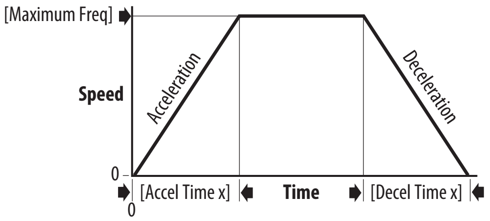


Values	Default:	10.00 s
	Min/Max:	0.00/600.00 s
	Display:	0.01 s

P042 [Decel Time 1] Related Parameter(s): P044, A439

Sets the time for the drive to decelerate from P044 [Maximum Freq] to 0 Hz.

Decel Rate = [Maximum Freq] / Decel Time x]



Values	Default:	10.00 s
	Min/Max:	0.00/600.00 s
	Display:	0.01 s

P043 [Minimum Freq] Related Parameter(s): b001, b002, b013, P044, A530, A531

Stop drive before changing this parameter.

Sets the lowest frequency the drive outputs.

Values	Default:	0.00 Hz
	Min/Max:	0.00/500.00 Hz
	Display:	0.01 Hz

Basic Program Group *(continued)*

P044 [Maximum Freq] Related Parameter(s): b001, b002, b013, b016, P043, A530, A531

Stop drive before changing this parameter.

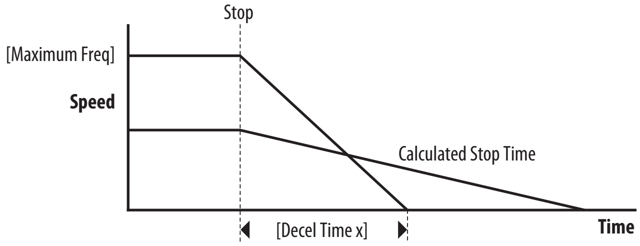
Sets the highest frequency the drive outputs.

IMPORTANT This value must be greater than the value set in P043 [Minimum Freq].

Values	Default:	60.00 Hz
	Min/Max:	0.00/500.00 Hz
	Display:	0.01 Hz

P045 [Stop Mode] Related Parameter(s): t086, t087, A434, A435

Determines the stopping mode used by the drive when a stop is initiated.

Options	0	"Ramp, CF" (Default)	Ramp to Stop. Stop command clears active fault.	
	1	"Coast, CF"	Coast to Stop. Stop command clears active fault.	
	2	"DC Brake, CF"	DC Injection Braking Stop. Stop command clears active fault.	
	3	"DC BrkAuto,CF"	DC Injection Braking Stop with Auto Shutoff. • Standard DC Injection Braking for value set in A434 [DC Brake Time]. OR • Drive shuts off if the drive detects that the motor is stopped. Stop command clears active fault.	
	4	"Ramp"	Ramp to Stop.	
	5	"Coast"	Coast to Stop.	
	6	"DC Brake"	DC Injection Braking Stop.	
	7	"DC BrakeAuto"	DC Injection Braking Stop with Auto Shutoff. • Standard DC Injection Braking for value set in A434 [DC Brake Time]. OR • Drive shuts off if the drive detects that the motor is stopped.	
	8	"Ramp+EM B,CF"	Ramp to Stop with EM Brake Control. Stop command clears active fault.	
	9	"Ramp+EM Brk"	Ramp to Stop with EM Brake Control.	
	10	"PointStp,CF"	PointStop. Stop command clears active fault.	Provides a method to stop at a constant distance instead of a fixed rate. 
	11	"PointStop"	PointStop.	

P046 [Start Source 1]
P048 [Start Source 2]
P050 [Start Source 3]

Related Parameter(s): b012, C125

Stop drive before changing this parameter.

Configures the start source of the drive. Changes to these inputs take effect as soon as they are entered. P046 [Start Source 1] is the factory default start source unless overridden. See Start and Speed Reference Control on page 49 for more information.

Options	1	"Keypad"	[Start Source 1] default
	2	"DigIn TrmBlk"	[Start Source 2] default
	3	"Serial/DSI"	[Start Source 3] default for PowerFlex 523
	4	"Network Opt"	
	5	"EtherNet/IP"(1)	[Start Source 3] default for PowerFlex 525

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(1) Setting is specific to PowerFlex 525 drives only.

Basic Program Group *(continued)*

P047 [Speed Reference1]
P049 [Speed Reference2]
P051 [Speed Reference3]

Related Parameter(s): C125

Selects the source of speed command for the drive. Changes to these inputs take effect as soon as they are entered. P047 [Speed Reference1] is the factory default speed reference unless overridden.
See Start and Speed Reference Control on page 49 for more information.

Options	1	"Drive Pot"	[Speed Reference1] default
	2	"Keypad Freq"	
	3	"Serial/DSI"	[Speed Reference3] default for PowerFlex 523
	4	"Network Opt"	
	5	"0-10V Input"	[Speed Reference2] default
	6	"4-20mA Input"	
	7	"Preset Freq"	
	8	"Anlg In Mult"(1)	
	9	"MOP"	
	10	"Pulse Input"	
	11	"PID1 Output"	
	12	"PID2 Output"(1)	
	13	"Step Logic"(1)	
	14	"Encoder"(1)	
	15	"EtherNet/IP"(1)	[Speed Reference3] default for PowerFlex 525
	16	"Positioning"(1)	Referencing from A558 [Positioning Mode]

(1) Setting is specific to PowerFlex 525 drives only.

P052 [Average kWh Cost]

Related Parameter(s): b025

Sets the average cost per kWh.

Values	Default:	0.00
	Min/Max:	0.00/655.35
	Display:	0.01

P053 [Reset To Defalts]

Stop drive before changing this parameter.

Resets all parameters to their factory default values. After a Reset command, the value of this parameter returns to zero.

Options	0	"Ready/Idle" (Default)	
	1	"Param Reset"	Does not reset custom group or P030 [Language] parameter.
	2	"Factory Rset"	Restore drive to factory condition.
	3	"Power Reset"	Resets only power parameters. Can be used when swapping power modules.

Terminal Block Group

t062 [DigIn TermBlk 02] **t063 [DigIn TermBlk 03]**
t065 [DigIn TermBlk 05] **t066 [DigIn TermBlk 06]**
t067 [DigIn TermBlk 07] **t068 [DigIn TermBlk 08]**
PF 525 PowerFlex 525 only.

Related Parameter(s): b012, b013, b014, P045, P046, P048, P049, P050, P051, t064, t086, A410-A425, A427, A431, A432, A433, A434, A435, A442, A443, A488, A535, A560, A562, A563, A567, A571

Stop drive before changing this parameter.

Programmable digital input. Changes to these inputs takes effect as soon as they are entered. If a digital input is set for a selection that is only usable on one input, no other input can be set for the same selection.

Options	0 “Not Used”	Terminal has no function but can be read over network communications with b013 [Contrl In Status] and b014 [Dig In Status].
	1 “Speed Ref 2”	Selects P049 [Speed Reference2] as drive's speed command.
	2 “Speed Ref 3”	Selects P051 [Speed Reference3] as drive's speed command.
	3 “Start Src 2”	Selects P048 [Start Source 2] as control source to start the drive.
	4 “Start Src 3”	Selects P050 [Start Source 3] as control source to start the drive.
	5 “Spd + Strt 2”	[DigIn TermBlk 07] default. Selects combination of P049 [Speed Reference2] and P048 [Start Source 2] as speed command with control source to start the drive.
	6 “Spd + Strt 3”	Selects combination of P051 [Speed Reference3] and P050 [Start Source 3] as speed command with control source to start the drive.
	7 “Preset Freq” (PF523: only for DigIn TermBlk 03, 05, and 06) (PF525: only for DigIn TermBlk 05...08)	[DigIn TermBlk 05] and [DigIn TermBlk 06] default. • Selects a preset frequency in Velocity mode (P047, P049, P051 [Speed Referencex] = 1...15). See A410...A425 [Preset Freq x]. • Selects a preset frequency and position in Positioning mode (P047, P049, P051 [Speed Referencex] = 16). See L200...L214 [Step Units x] (only for PowerFlex 525 drives). **IMPORTANT** Digital Inputs have priority for frequency control when programmed as Preset Speed and are active. See Start Source and Speed Reference Selection on page 49 for more information.
	8 “Jog”	• When input is present, drive accelerates according to the value set in A432 [Jog Accel/Decel] and ramps to the value set in A431 [Jog Frequency]. • When input is removed, drive ramps to a stop according to the value set in A432 [Jog Accel/Decel]. • A valid Start command will override this input.
	9 “Jog Forward”	[DigIn TermBlk 08] default. Drive accelerates to A431 [Jog Frequency] according to A432 [Jog Accel/Decel] and ramps to a stop when input becomes inactive. A valid Start command will override this input.
	10 “Jog Reverse”	Drive accelerates to A431 [Jog Frequency] according to A432 [Jog Accel/Decel] and ramps to a stop when input becomes inactive. A valid Start command will override this input.
	11 “Acc/Dec Sel2”(1)	If active, determines which Accel/Decel time will be used for all ramp rates except jog. Can be used with option 29 “Acc/Dec Sel3” for additional Accel/Decel times. See A442 [Accel Time 2] for more information.
	12 “Aux Fault”	When enabled, an F002 “Auxiliary Input” fault will occur when the input is removed.
	13 “Clear Fault”	When active, clears an active fault.
	14 “RampStop,CF”	Causes drive to immediately ramp to a stop regardless of how P045 [Stop Mode] is set.
	15 “CoastStop,CF”	Causes drive to immediately coast to a stop regardless of how P045 [Stop Mode] is set.
	16 “DCInjStop,CF”	Causes drive to immediately begin a DC Injection stop regardless of how P045 [Stop Mode] is set.
	17 “MOP Up”	Increases the value of A427 [MOP Freq] at the rate set in A430 [MOP Time].
	18 “MOP Down”	Decreases the value of A427 [MOP Freq] at the rate set in A430 [MOP Time].
	19 “Timer Start”(1)	Clears and starts the timer function. May be used to control the relay or opto outputs.
	20 “Counter In”(1)	Starts the counter function. May be used to control the relay or opto outputs.
	21 “Reset Timer”	Clears the active timer.
	22 “Reset Countr”	Clears the active counter.
	23 “Rset Tim&Cnt”	Clear the active timer and counter.
	24 “Logic In 1”(1)(2)	Logic function input number 1. May be used to control the relay or opto outputs (t076, t081 [Relay Outx Sel] and t069, t072 [Opto Outx Sel], options 11...14). May be used in conjunction with StepLogic parameters L180...L187 [Stp Logic x].
	25 “Logic In 2”(1)(2)	Logic function input number 2. May be used to control the relay or opto outputs (t076, t081 [Relay Outx Sel] and t069, t072 [Opto Outx Sel], options 11...14). May be used in conjunction with StepLogic parameters L180...L187 [Stp Logic x].

<table>
<tr><td>Options</td><td>26 “Current Lmt2”(2)</td><td>When active, A485 [Current Limit 2] determines the drive current limit level.</td></tr>
<tr><td></td><td>27 “Anlg Invert”</td><td>Inverts the scaling of the analog input levels set in
t091 [Anlg In 0-10V Lo] and t092 [Anlg In 0-10V Hi] or
t095 [Anlg In4-20mA Lo] and t096 [Anlg In4-20mA Hi].</td></tr>
<tr><td></td><td>28 “EM Brk Rlse”</td><td>If EM brake function is enabled, this input releases the brake. See t086 [EM Brk Off Delay] for more information.
ATTENTION: If a hazard of injury due to movement of equipment or material exists, an auxiliary mechanical braking device must be used.</td></tr>
<tr><td></td><td>29 “Acc/Dec Sel3”(1)</td><td>If active, determines which Accel/Decel time is used for all ramp rates except jog. Used with option 11 “Acc/Dec Sel2” for the Accel/Decel times listed in this table.
<table>
<tr><th colspan="2">Option</th><th>Description</th></tr>
<tr><th>29</th><th>11</th><th></th></tr>
<tr><td>0</td><td>0</td><td>Acc/Dec 1</td></tr>
<tr><td>0</td><td>1</td><td>Acc/Dec 2</td></tr>
<tr><td>1</td><td>0</td><td>Acc/Dec 3</td></tr>
<tr><td>1</td><td>1</td><td>Acc/Dec 4</td></tr>
</table></td></tr>
<tr><td></td><td>30 “Precharge En”</td><td>Forces drive into precharge state. Typically controlled by auxiliary contact on the disconnect at the DC input to the drive. If this input is assigned, it must be energized for the pre-charge relay to close and for the drive to run. If it is de-energized, the pre-charge relay opens and the drive coasts to a stop.</td></tr>
<tr><td></td><td>31 “Inertia Dcel”</td><td>Forces drive into Inertia Ride-Through state. The drive attempts to regulate the DC bus at the current level.</td></tr>
<tr><td></td><td>32 “Sync Enable”</td><td>Must be used in order to hold the existing frequency when Sync Time is set to enable speed synchronization. When this input is released the drive accelerates to the commanded frequency in A571 [Sync Time].</td></tr>
<tr><td></td><td>33 “Traverse Dis”</td><td>When an input is programmed the traverse function is disabled while this input is active. See A567 [Max Traverse].</td></tr>
<tr><td></td><td>34 “Home Limit”(2)</td><td>In Positioning mode, indicates the drive is at the home position. See Appendix E for more information on Positioning.</td></tr>
<tr><td></td><td>35 “Find Home”(2)</td><td>In Positioning mode, causes the drive to return to the Home position when a Start command is issued.
Uses A562 [Find Home Freq] and A563 [Find Home Dir] until the “Home Limit” input is activated. If it passes this point, it then runs in the reverse direction at 1/10th the frequency of [Find Home Freq] until the “Home Limit” is activated again. As long as this input is active, any start command causes the drive to enter the homing routine. Only functions if in Positioning mode. Once the Find Home routine has finished, the drive stops. See Appendix E for more information on Positioning.</td></tr>
<tr><td></td><td>36 “Hold Step”(2)</td><td>In Positioning mode, overrides other inputs and causes the drive to remain at its current step (running at zero speed once it reaches its position) until released.
While in “Hold”, the drive ignores any input command which would normally result in a move to a new step. Timers continue to run. Therefore, when the Hold is removed, the drive must see any required digital inputs transition (even if they already transitioned during the hold), but it does not reset any timer. See Appendix E for more information on Positioning.</td></tr>
<tr><td></td><td>37 “Pos Redefine”(2)</td><td>In Positioning mode, resets the home position to the current position of the machine. See Appendix E for more information on Positioning.</td></tr>
<tr><td></td><td>38 “Force DC”</td><td>If the drive is not running, causes the drive to apply a DC Holding current (A435 [DC Brake Level], ignoring A434 [DC Brake Time]) while the input is applied.</td></tr>
<tr><td></td><td>39 “Damper Input”</td><td>When active, drive is allowed to run normally.
When inactive, drive is forced into sleep mode and is prevented from accelerating to command speed.</td></tr>
<tr><td></td><td>40 “Purge”(1)</td><td>Starts the drive at A433 [Purge Frequency] regardless of the selected control source. Supersedes the keypad Control function as well as any other control command to take control of the drive. Purge can occur, and is operational, at any time whether the drive is running or stopped regardless of the selected logic source selection. If a valid stop (other than from comms or SW enable) is present, the drive will not start on the purge input transition.
ATTENTION: If a hazard of injury due to movement of equipment or material exists, an auxiliary mechanical braking device must be used.</td></tr>
<tr><td></td><td>41 “Freeze-Fire”</td><td>When inactive, will cause an immediate F094 “Function Loss” fault. Use to safely bypass the drive with an external switching device.</td></tr>
<tr><td></td><td>42 “SW Enable”</td><td>Works like an interlock that has to be active for the drive to run.</td></tr>
<tr><td></td><td>43 “SherPin1 Dis”</td><td>Disables shear pin 1 but leaves shear pin 2 active. If A488 [Shear Pin 2 Level] is greater than 0.0 A, shear pin 2 is enabled.</td></tr>
<tr><td></td><td>44 Reserved</td><td></td></tr>
<tr><td></td><td>45 Reserved</td><td></td></tr>
<tr><td></td><td>46 Reserved</td><td></td></tr>
<tr><td></td><td>47 Reserved</td><td></td></tr>
</table>

Options	48 "2-Wire FWD" (only for DigIn TermBlk 02)	[DigIn TermBlk 02] default. Select 2-Wire FWD for this input. Select this option and set P046, P048 or P050 [Start Source x] to 2 "DigIn TrmBlk" to configure [Start Source x] to a 2-wire run forward mode. Also see t064 [2-Wire Mode] for level trigger settings.
	49 "3-Wire Start" (only for DigIn TermBlk 02)	Select 3-Wire Start for this input. Select this option and set P046, P048 or P050 [Start Source x] to 2 "DigIn TrmBlk" to configure [Start Source x] to a 3-wire start mode.
	50 "2-Wire REV" (only for DigIn TermBlk 03)	[DigIn TermBlk 03] default. Select 2-Wire REV for this input. Select this option and set P046, P048 or P050 [Start Source x] to 2 "DigIn TrmBlk" to configure [Start Source x] to a 2-wire run reverse mode. Also see t064 [2-Wire Mode] for level trigger settings. For PowerFlex 523 drives, this setting will be disabled If [DigIn TermBlk 03] is set to 7 "Preset Freq".
	51 "3-Wire Dir" (only for DigIn TermBlk 03)	Select 3-Wire Dir for this input. Select this option and set P046, P048 or P050 [Start Source x] to 2 "DigIn TrmBlk" to change the direction of [Start Source x]. For PowerFlex 523 drives, this setting will be disabled If [DigIn TermBlk 03] is set to 7 "Preset Freq".
	52 "Pulse Train" (PF523: only for DigIn TermBlk 05) (PF525: only for DigIn TermBlk 07)	Select pulse train for this input. Use P047, P049 and P051 [Speed Referencex] to select pulse input. Jumper for DigIn TermBlk 05 or 07 Sel must be moved to Pulse In.

(1) This function may be tied to one input only.
(2) Setting is specific to PowerFlex 525 drives only.

t064 [2-Wire Mode] Related Parameter(s): P045, P046, P048, P050, t062, t063

Stop drive before changing this parameter.

Programs the mode of trigger only for t062 [DigIn TermBlk 02] and t063 [DigIn TermBlk 03] when 2-wire option is being selected as P046, P048 or P050 [Start Source x].

Options	0 "Edge Trigger" (Default)	Standard 2-Wire operation.
	1 "Level Sense"	• I/O Terminal 01 "Stop" = Coast to stop. Drive will restart after a Stop command when: – Stop is removed and – Start is held active • I/O Terminal 03 "Run REV" **ATTENTION:** Hazard of injury exists due to unintended operation. When set to option 3, and the Run input is maintained, the Run inputs do not need to be toggled after a Stop input for the drive to run again. A Stop function is provided only when the Stop input is active (open).
	2 "Hi-Spd Edge"	**IMPORTANT** There is greater potential voltage on the output terminals when using this option. • Outputs are kept in a ready-to-run state. The drive will respond to a Start command within 10 ms. • I/O Terminal 01 "Stop" = Coast to stop. • I/O Terminal 03 "Run REV"
	3 "Momentary"	• Drive will start after a momentary input from either the Run FWD input (I/O Terminal 02) or the Run REV input (I/O Terminal 03). • I/O Terminal 01 "Stop" = Stop according to the value set in P045 [Stop Mode].

Terminal Block Group *(continued)*

t069 [Opto Out1 Sel]
t072 [Opto Out2 Sel]

Related Parameter(s): P046, P048, P050, t070, t073, t077, t082, t086, t087, t093, t094, t097, A541, A564

PF 525 PowerFlex 525 only.

Determines the operation of the programmable digital outputs.

Options	Setting Output Changes State When...	Hysteresis
0 "Ready/Fault"	Opto outputs are active when power is applied. Indicates that the drive is ready for operation. Opto outputs are inactive when power is removed or a fault occurs.	None
1 "At Frequency"	Drive reaches commanded frequency.	0.5 Hz above; 1.0 Hz below
2 "MotorRunning"	Motor is receiving power from the drive.	None
3 "Reverse"	Drive is commanded to run in reverse direction.	None
4 "Motor Overld"	Motor overload condition exists.	100 ms time delay on or off
5 "Ramp Reg"	Ramp regulator is modifying the programmed accel/decel times to avoid an overcurrent or overvoltage fault from occurring.	100 ms time delay on or off
6 "Above Freq"	Drive exceeds the frequency (Hz) value set in t070 or t073 [Opto Outx Level].	100 ms time delay on or off
7 "Above Cur"	Drive exceeds the current (% Amps) value set in t070 or t073 [Opto Outx Level]. **IMPORTANT** Value for t070 or t073 [Opto Outx Level] must be entered in percent of drive rated output current.	100 ms time delay on or off
8 "Above DCVolt"	Drive exceeds the DC bus voltage value set in t070 or t073 [Opto Outx Level].	100 ms time delay on or off
9 "Retries Exst"	Value set in A541 [Auto Rstrt Tries] is exceeded.	None
10 "Above Anlg V"	Analog input voltage (0-10V input) exceeds the value set in t070 or t073 [Opto Outx Level]. **IMPORTANT** Do not use if t093 [10V Bipolar Enbl] is set to 1 "Bi-Polar In".	100 ms time delay on or off
11 "Above PF Ang"	Power Factor angle exceeds the value set in t070 or t073 [Opto Outx Level].	100 ms time delay on or off
12 "Anlg In Loss"	Analog input loss has occurred. Program t094 [Anlg In V Loss] or t097 [Anlg In mA Loss] for desired action when input loss occurs.	On, 2 mA / ±1V Off, 3 mA / ±1.5V
13 "ParamControl"	Output is directly controlled by the state of the t070 or t073 [Opto Outx Level]. A value of 0 causes the output to turn off. A value of 1 or greater in this parameter causes the output to turn on.	None
14 "NonRec Fault"	• Value set in A541 [Auto Rstrt Tries] is exceeded or • A541 [Auto Rstrt Tries] is not enabled or • A non-resettable fault has occurred.	None
15 "EM Brk Cntrl"	EM Brake is energized. Program t087 [EM Brk On Delay] and t086 [EM Brk Off Delay] for desired action.	None
16 "Thermal OL"	Relay energizes when thermal Motor overload counter is above the value set in t077 or t082 [Relay Outx Level]. It also energizes if the drive is within 5 °C of the drive overheat trip point.	None
17 "Amb OverTemp"	Relay energizes when control module over temperature occurs.	None
18 "Local Active"	Active when drive P046, P048 or P050 [Start Source x] is in local keypad control.	None
19 "Comm Loss"	Active when communication is lost from any comm source with reference or control.	None
20 "Logic In 1"	An input is programmed as "Logic Input 1" and is active.	None
21 "Logic In 2"	An input is programmed as "Logic Input 2" and is active.	None
22 "Logic 1 & 2"	Both Logic inputs are programmed and active.	None
23 "Logic 1 or 2"	One or both Logic inputs are programmed and one or both is active.	None
24 "StpLogic Out"	Drive enters StepLogic step with Command Word set to enable Logic output.	None
25 "Timer Out"	Timer has reached the value set in t070 or t073 [Opto Outx Level] or not timing.	None
26 "Counter Out"	Counter has reached the value set in t070 or t073 [Opto Outx Level] or not counting.	None
27 "At Position"	Drive is in Positioning mode and has reached the commanded position. Tolerance is adjusted with A564 [Encoder Pos Tol].	–
28 "At Home"	Drive is in Positioning mode and has reached the home position. Tolerance is adjusted with A564 [Encoder Pos Tol].	–
29 "Safe-Off"	Both safe-off inputs are active.	–

Values	Default: Opto Out1 Sel: Opto Out2 Sel:	 2 1
	Min/Max:	0/29
	Display:	1

Terminal Block Group *(continued)*

t070 [Opto Out1 Level]
t073 [Opto Out2 Level]

Related Parameter(s): t069, t072

32 32 bit parameter.

PF 525 PowerFlex 525 only.

Determines the on/off point for the digital outputs when t069 or t072 [Opto Outx Sel] is set to the values shown below.

Min/Max Value Range Based On [Opto Outx Sel] Setting							
6:	0…500 Hz	10:	0…100%	16:	0.1…9999 s	20:	0/1
7:	0…180%	11	0/1	17:	1…9999 counts	26:	0…150%
8:	0…815V	13	0…800	18:	0…180°	–	

Values	Default:	0
	Min/Max:	0/9999
	Display:	1

t075 [Opto Out Logic]

PF 525 PowerFlex 525 only.

Determines the logic (Normally Open/NO or Normally Closed/NC) of the digital outputs only.

Setting	Digital Out 1 Logic	Digital Out 2 Logic
0	NO	NO
1	NC	NO
2	NO	NC
3	NC	NC

Values	Default:	0
	Min/Max:	0/3
	Display:	1

Terminal Block Group *(continued)*

t076 [Relay Out1 Sel] Related Parameter(s): P046, P048, P050, t070, t073, t077, t082, t086, t087, t093, t094, t097, A541, A564

t081 [Relay Out2 Sel]

PF 525 PowerFlex 525 only.

Determines the operation of the programmable output relay.

Options	Output Relay Changes State When...	Hysteresis
0 “Ready/Fault”	Relay changes state when power is applied. Indicates that the drive is ready for operation. Relay returns drive to shelf state when power is removed or a fault occurs.	None
1 “At Frequency”	Drive reaches commanded frequency.	0.5 Hz above; 1.0 Hz below
2 “MotorRunning”	Motor is receiving power from the drive.	None
3 “Reverse”	Drive is commanded to run in reverse direction.	None
4 “Motor Overld”	Motor overload condition exists.	100 ms time delay on or off
5 “Ramp Reg”	Ramp regulator is modifying the programmed accel/ decel times to avoid an overcurrent or overvoltage fault from occurring.	100 ms time delay on or off
6 “Above Freq”	Drive exceeds the frequency (Hz) value set in t077 or t082 [Relay Outx Level].	100 ms time delay on or off
7 “Above Cur”	Drive exceeds the current (% Amps) value set in t077 or t082 [Relay Outx Level]. **IMPORTANT** Value for t077 or t082 [Relay Outx Level] must be entered in percent of drive rated output current.	100 ms time delay on or off
8 “Above DCVolt”	Drive exceeds the DC bus voltage value set in t077 or t082 [Relay Outx Level].	100 ms time delay on or off
9 “Retries Exst”	Value set in A541 [Auto Rstrt Tries] is exceeded.	None
10 “Above Anlg V”	Analog input voltage (0-10V input) exceeds the value set in t077 or t082 [Relay Outx Level]. **IMPORTANT** Do not use if t093 [10V Bipolar Enbl] is set to 1 “Bi-Polar In”.	100 ms time delay on or off
11 “Above PF Ang”	Power Factor angle exceeds the value set in t077 or t082 [Relay Outx Level].	100 ms time delay on or off
12 “Anlg In Loss”	Analog input loss has occurred. Program t094 [Anlg In V Loss] or t097 [Anlg In mA Loss] for desired action when input loss occurs.	On, 2 mA / ±1V Off, 3 mA / ±1.5V
13 “ParamControl”	Output will be directly controlled by the state of the t077 or t082 [Relay Outx Level]. A value of 0 causes the output to turn off. A value of 1 or greater in this parameter causes the output to turn on.	None
14 “NonRec Fault”	• Value set in A541 [Auto Rstrt Tries] is exceeded or • A541 [Auto Rstrt Tries] is not enabled or • A non-resettable fault has occurred.	None
15 “EM Brk Cntrl”	EM Brake is energized. Program t087 [EM Brk On Delay] and t086 [EM Brk Off Delay] for desired action.	None
16 “Thermal OL”	Relay energizes when thermal Motor overload counter is above the value set in t077 or t082 [Relay Outx Level]. It also energizes if the drive is within 5°C of the drive overheat trip point.	None
17 “Amb OverTemp”	Relay energizes when control module over temperature occurs.	None
18 “Local Active	Active when drive P046, P048 or P050 [Start Source x] is in local keypad control.	None
19 “Comm Loss”	Active when communication is lost from any comm source with reference or control.	None
20 “Logic In 1”(1)	An input is programmed as “Logic Input 1” and is active.	None
21 “Logic In 2”(1)	An input is programmed as “Logic Input 2” and is active.	None
22 “Logic 1 & 2”(1)	Both Logic inputs are programmed and active.	None
23 “Logic 1 or 2”(1)	One or both Logic inputs are programmed and one or both is active.	None
24 “StpLogic Out”(1)	Drive enters StepLogic step with Command Word set to enable Logic output.	None
25 “Timer Out”	Timer has reached the value set in t077 or t082 [Relay Outx Level] or not timing.	None
26 “Counter Out”	Counter has reached the value set in t077 or t082 [Relay Outx Level] or not counting.	None
27 “At Position”(1)	Drive is in Positioning mode and has reached the commanded position. Tolerance is adjusted with A564 [Encoder Pos Tol].	–
28 “At Home”(1)	Drive is in Positioning mode and has reached the home position. Tolerance is adjusted with A564 [Encoder Pos Tol].	–
29 “Safe-Off”(1)	Both safe-off inputs are active.	–

Values	Default: Relay Out1 Sel: Relay Out2 Sel:	 0 2
	Min/Max:	0/29
	Display:	1

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(1) Setting is specific to PowerFlex 525 drives only.

Terminal Block Group *(continued)*

t077 [Relay Out1 Level]

Related Parameter(s): t076, t081

t082 [Relay Out2 Level]

PF 525 PowerFlex 525 only.

32 32 bit parameter.

Determines the on/off point for the output relay when t076 or t081 [Relay Outx Sel] is set to the values shown below.

Min/Max Value Range Based On [Relay Outx Sel] Setting							
6:	0…500 Hz	10:	0…100%	16:	0.1…9999 s	20:	0/1
7:	0…180%	11:	0/1	17:	1…9999 counts	26:	0…150%
8:	0…815V	13:	0…800	18:	0…180°	–	

Values	Default:	0
	Min/Max:	0/9999
	Display:	1

t079 [Relay 1 On Time]

t084 [Relay 2 On Time]

PF 525 PowerFlex 525 only.

Sets the delay time before Relay energizes after required condition is met.

Values	Default:	0.0 s
	Min/Max:	0.0/600.0 s
	Display:	0.1 s

t080 [Relay 1 Off Time]

t085 [Relay 2 Off Time]

PF 525 PowerFlex 525 only.

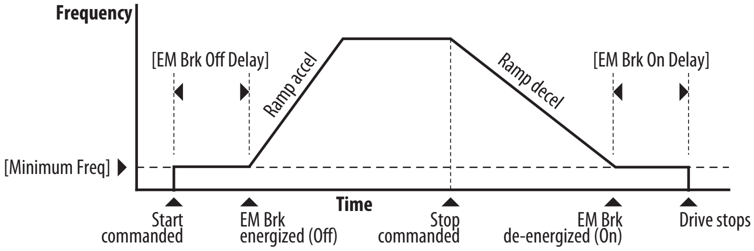
Sets the delay time before Relay de-energizes after required condition ceases.

Values	Default:	0.0 s
	Min/Max:	0.0/600.0 s
	Display:	0.1 s

t086 [EM Brk Off Delay]

Related Parameter(s): P045

Sets the time the drive remains at minimum frequency before ramping up to the commanded frequency (and engaging the brake coil relay) if Electromechanical (EM) Brake Control Mode is enabled with P045 [Stop Mode].


Frequency
[EM Brk Off Delay]
Ramp accel
Ramp decel
[EM Brk On Delay]
[Minimum Freq]
Time
Start commanded
EM Brk energized (Off)
Stop commanded
EM Brk de-energized (On)
Drive stops

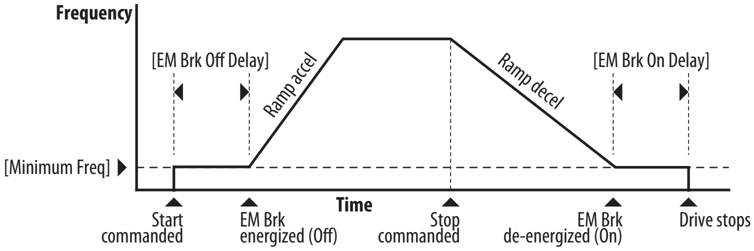
Values	Default:	2.00 s
	Min/Max:	0.00/10.00 s
	Display:	0.01 s

Terminal Block Group *(continued)*

t087 [EM Brk On Delay]

Related Parameter(s): P045

Sets the time the drive remains at minimum frequency (after releasing the brake coil relay) before stopping if EM Brake Control Mode is enabled with P045 [Stop Mode].



Values	Default:	2.00 s
	Min/Max:	0.00/10.00 s
	Display:	0.01 s

t088 [Analog Out Sel]

Related Parameter(s): t090

PF 525 PowerFlex 525 only.

The 0-10V, 0-20 mA or 4-2 0 mA analog output can be used to provide a signal proportional to several drive conditions. This parameter also selects which analog calibration parameters to use.

Options	Output Range	Minimum Output Value	Maximum Output Value = t089 [Analog Out High]	Filter(1)	Related Parameter
0 "OutFreq 0-10"	0-10V	0V = 0 Hz	[Maximum Freq]	None	b001
1 "OutCurr 0-10"	0-10V	0V = 0 A	200% Drive Rated FLA	Filter A	b003
2 "OutVolt 0-10"	0-10V	0V = 0 V	120% Drive Rated Output Volts	None	b004
3 "OutPowr 0-10"	0-10V	0V = 0 kW	200% Drive Rated Power	Filter A	b017
4 "OutTorq 0-10"	0-10V	0V = 0 A	200% Drive Rated FLA	Filter A	d382
5 "TstData 0-10"	0-10V	0V = 0000	65535 (Hex FFFF)	None	–
6 "Setpnt 0-10"	0-10V	0V = 0%	100.0% Setpoint setting	None	t090
7 "DCVolt 0-10"	0-10V	0V = 0V	100.0% of trip value	None	b005
8 "OutFreq 0-20"	0-20 mA	0 mA = 0 Hz	[Maximum Freq]	None	b001
9 "OutCurr 0-20"	0-20 mA	0 mA = 0 A	200% Drive Rated FLA	Filter A	b003
10 "OutVolt 0-20"	0-20 mA	0 mA = 0 V	120% Drive Rated Output Volts	None	b004
11 "OutPowr 0-20"	0-20 mA	0 mA = 0 kW	200% Drive Rated Power	Filter A	b017
12 "OutTorq 0-20"	0-20 mA	0 mA = 0 A	200% Drive Rated FLA	Filter A	d382
13 "TstData 0-20"	0-20 mA	0 mA = 0000	65535 (Hex FFFF)	None	–
14 "Setpnt 0-20"	0-20 mA	0 mA = 0%	100.0% Setpoint setting	None	t090
15 "DCVolt 0-20"	0-20 mA	0 mA = 0V	100.0% of trip value	None	b005
16 "OutFreq 4-20"	4-20 mA	4 mA = 0 Hz	[Maximum Freq]	None	b001
17 "OutCurr 4-20"	4-20 mA	4 mA = 0 A	200% Drive Rated FLA	Filter A	b003
18 "OutVolt 4-20"	4-20 mA	4 mA = 0 V	120% Drive Rated Output Volts	None	b004
19 "OutPowr 4-20"	4-20 mA	4 mA = 0 kW	200% Drive Rated Power	Filter A	b017
20 "OutTorq 4-20"	4-20 mA	4 mA = 0 A	200% Drive Rated FLA	Filter A	d382
21 "TstData 4-20"	4-20 mA	4 mA = 0000	65535 (Hex FFFF)	None	–
22 "Setpnt 4-20"	4-20 mA	4 mA = 0%	100.0% Setpoint setting	None	t090
23 "DCVolt 4-20"	4-20 mA	4 mA = 0V	100.0% of trip value	None	b005

(1) Filter A is a single pole digital filter with a 162 ms time constant. Given a 0…100% step input from a steady state, the output of Filter A takes 500 ms to get to 95% of maximum, 810 ms to get to 99%, and 910 ms to get to 100%.

Values	Default:	0
	Min/Max:	0/23
	Display:	1

Terminal Block Group *(continued)*

t089 [Analog Out High]

PF 525 PowerFlex 525 only.

Scales the maximum output value (V or mA) when the source setting is at maximum.

Values	Default:	100%
	Min/Max:	0/800%
	Display:	1%

t090 [Anlg Out Setpt]

Related Parameter(s): t088

PF 525 PowerFlex 525 only.

Sets the percentage of output desired when t088 [Analog Out Sel] is set to 6, 14 or 22 “Analog Setpoint”.

Values	Default:	0.0%
	Min/Max:	0.0/100.0%
	Display:	0.1%

t091 [Anlg In 0-10V Lo]

Related Parameter(s): P043, t092, t093

Stop drive before changing this parameter.

Sets the percentage (based on 10V) of input voltage applied to the 0-10V analog input used to represent P043 [Minimum Freq].
Analog inversion can be accomplished by setting this value larger than t092 [Anlg In 0-10V Hi].
If t093 [10V Bipolar Enbl] is set to 1 “Bi-Polar In”, this parameter is ignored.

Values	Default:	0.0%
	Min/Max:	0.0/200.0%
	Display:	0.1%

t092 [Anlg In 0-10V Hi]

Related Parameter(s): P044, t091, t093

Stop drive before changing this parameter.

Sets the percentage (based on 10V) of input voltage applied to the 0-10V analog input used to represent P044 [Maximum Freq].
Analog inversion can be accomplished by setting this value smaller than t091 [Anlg In 0-10V Lo].
If t093 [10V Bipolar Enbl] is set to 1 “Bi-Polar In”, the same value applies to positive and negative voltage.

Values	Default:	100.0%
	Min/Max:	0.0/200.0%
	Display:	0.1%

t093 [10V Bipolar Enbl]

Related Parameter(s): t091, t092

PF 525 PowerFlex 525 only.

Enables/disables bi-polar control. In bi-polar mode direction is commanded by the polarity of the voltage.
If bi-polar control is enabled, P043 [Minimum Freq] and t091 [Anlg In 0-10V Lo] are ignored.

Options	0	“Uni-Polar In” (Default)	0-10V only
	1	“Bi-Polar In”	±10V

Terminal Block Group *(continued)*

t094 [Anlg In V Loss]

Related Parameter(s): P043, P044, A426, A427

Sets the response to a loss of input. When the 0-10V input (or –10 to +10V) is used for any reference, any input less than 1V is reported as a signal loss. Input must exceed 1.5V for the signal loss condition to end.

If enabled, this function affects any input that is being used as a speed reference, PID reference or PID setpoint in the drive.

Options	0	"Disabled" (Default)
	1	"Fault (F29)"
	2	"Stop"
	3	"Zero Ref"
	4	"Min Freq Ref"
	5	"Max Freq Ref"
	6	"Key Freq Ref"
	7	"MOP Freq Ref"
	8	"Continu Last"

t095 [Anlg In4-20mA Lo]

Related Parameter(s): P043, t096

Stop drive before changing this parameter.

Sets the percentage (based on 4-20 mA) of input current applied to the 4-20 mA analog input used to represent P043 [Minimum Freq].

Analog inversion can be accomplished by setting this value larger than t096 [Anlg In4-20mA Hi].

Values	Default:	0.0%
	Min/Max:	0.0/100.0%
	Display:	0.1%

t096 [Anlg In4-20mA Hi]

Related Parameter(s): P044, t095

Stop drive before changing this parameter.

Sets the percentage (based on 4-20 mA) of input current applied to the 4-20 mA analog input used to represent P044 [Maximum Freq].

Analog inversion can be accomplished by setting this value smaller than t095 [Anlg In4-20mA Lo].

Values	Default:	100.0%
	Min/Max:	0.0/200.0%
	Display:	0.1%

t097 [Anlg In mA Loss]

Related Parameter(s): P043, P044, A426, A427

Sets the response to a loss of input. When the 4-20mA input is used for any reference, any input less than 2 mA is reported as a signal loss. Input must exceed 3 mA for the signal loss condition to end.

If enabled, this function affects any input that is being used as a speed reference or PID reference or PID setpoint in the drive.

Options	0	"Disabled" (Default)
	1	"Fault (F29)"
	2	"Stop"
	3	"Zero Ref"
	4	"Min Freq Ref"
	5	"Max Freq Ref"
	6	"Key Freq Ref"
	7	"MOP Freq Ref"
	8	"Continu Last"

Terminal Block Group *(continued)*

t098 [Anlg Loss Delay]

Related Parameter(s): t094, t097

Sets the length of time after power-up during which the drive detects no analog signal loss.
Response to an analog signal loss is set in t094 or t097 [Analog In x Loss].

Values	Default:	0.0 s
	Min/Max:	0.0 /20.0 s
	Display:	0.1 s

t099 [Analog In Filter]

Sets the level of additional filtering of the analog input signals. A higher number increases filtering and decreases bandwidth. Each setting doubles the applied filtering (1 = 2x filter, 2 = 4x filter, and so on).

Values	Default:	0
	Min/Max:	0/14
	Display:	1

t100 [Sleep-Wake Sel]

Related Parameter(s): t101, t102, t103

Drive "sleeps" if the appropriate analog input drops below the set t101 [Sleep Level] for the time set in t102 [Sleep Time] and the drive is running. When entering sleep mode the drive ramps to zero and the run indicator on the keypad display flashes to indicate the drive is in "sleep" mode.
When the appropriate analog input rises above the set [Sleep Level], the drive "wakes" and ramps to the commanded frequency.
Inversion can be accomplished by setting [Sleep Level] to a higher setting than t103 [Wake Level].

ATTENTION: Enabling the Sleep-Wake function can cause unexpected machine operation during the Wake mode. Equipment damage and/or personal injury can result if this parameter is used in an inappropriate application. In addition, all applicable local, national and international codes, standards, regulations or industry guidelines must be considered.

Options	0	"Disabled" (Default)	
	1	"0-10V Input"	Sleep enabled from 0-10V Analog Input 1
	2	"4-20mA Input"	Sleep enabled from 4-20 mA Analog Input 2
	3	"Command Freq"	Sleep enabled based on drive commanded frequency

t101 [Sleep Level]

Sets the analog input level the drive must reach to enter sleep mode.

Values	Default:	10.0%
	Min/Max:	0.0/100.0%
	Display:	0.1%

t102 [Sleep Time]

Sets the analog input time the drive must stay below to enter sleep mode.

Values	Default:	0.0 s
	Min/Max:	0.0/600.0 s
	Display:	0.1 s

t103 [Wake Level]

Sets the analog input level the drive must reach to wake from sleep mode.

Values	Default:	15.0%
	Min/Max:	0.0/100.0%
	Display:	0.1%

Terminal Block Group *(continued)*

t104 [Wake Time]

Sets the analog input time the drive must stay above to wake from sleep mode.

Values	Default:	0.0 s
	Min/Max:	0.0/600.0 s
	Display:	0.1 s

t105 [Safety Open En]

PF 525 PowerFlex 525 only.

Sets the action when both safety inputs (Safety 1 and Safety 2) are disabled (de-energized – no power is applied).

Options	0	"FaultEnable" (Default)
	1	"FaultDisable"

Communications Group

C121 [Comm Write Mode]

Saves parameter values in active drive memory (RAM) or in drive non-volatile memory (EEPROM).

ATTENTION: If Automatic Drive Configuration (ADC) is used, this parameter must remain at its default value of 0 "Save".

IMPORTANT Parameter values set prior to setting 1 "RAM only" are saved in RAM.

Options	0	"Save" (Default)
	1	"RAM only"

C122 [Cmd Stat Select]

PF 525 PowerFlex 525 only.

Selects velocity-specific or position/fibers-specific Command and Status Word bit definitions for use over a communication network. See Writing (06) Logic Command Data on page 191 for more information. This parameter cannot be changed when an I/O connection is established through the communication adapter or the drive's embedded EtherNet/IP port.

Options	0	"Velocity" (Default)
	1	"Position"

C123 [RS485 Data Rate]

Sets the communications baud rate (bits/second) for the RS485 port. A reset or power cycle is required after selection is made.

Options	0	"1200"
	1	"2400"
	2	"4800"
	3	"9600" (Default)
	4	"19,200"
	5	"38,400"

C124 [RS485 Node Addr]

Sets the Modbus drive node number (address) for the RS485 port if using a network connection. A reset or power cycle is required after selection is made.

Values	Default:	100
	Min/Max:	1/247
	Display:	1

C125 [Comm Loss Action]

Related Parameter(s): P045

Sets the drive's response to a loss of connection or excessive communication errors on the RS485 port.

Options	0	"Fault" (Default)	
	1	"Coast Stop"	Stops drive using "Coast to stop".
	2	"Stop"	Stops drive using P045 [Stop Mode] setting.
	3	"Continu Last"	Drive continues operating at communication commanded speed saved in RAM.

C126 [Comm Loss Time]

Related Parameter(s): C125

Sets the time that the drive remains in communication loss with the RS485 port before taking the action specified in C125 [Comm Loss Action]. See Appendix C for more information.

IMPORTANT This setting is effective only if I/O that controls the drive is transmitted through the RS485 port.

Values	Default:	5.0 s
	Min/Max:	0.1/60.0 s
	Display:	0.1 s

Communications Group *(continued)*

C127 [RS485 Format]

Determines the details related to the specific Modbus protocol used by the drive. A reset or power cycle is required after selection is made.

Options	0	"RTU 8-N-1" (Default)
	1	"RTU 8-E-1"
	2	"RTU 8-O-1"
	3	"RTU 8-N-2"
	4	"RTU 8-E-2"
	5	"RTU 8-O-2"

C128 [EN Addr Sel]

Related Parameter(s): C129-C132, C133-C136, C137-C140

PF 525 PowerFlex 525 only.

Enables the IP address, subnet mask and gateway address to be set with a BOOTP server. Identifies the connections that would be attempted on a reset or power cycle. A reset or power cycle is required after selection is made.

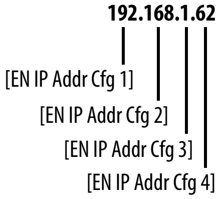
Options	1	"Parameters"
	2	"BOOTP" (Default)

C129 [EN IP Addr Cfg 1]
C130 [EN IP Addr Cfg 2]
C131 [EN IP Addr Cfg 3]
C132 [EN IP Addr Cfg 4]

Related Parameter(s): C128

PF 525 PowerFlex 525 only.

Sets the bytes in the IP address. A reset or power cycle is required after selection is made.



IMPORTANT C128 [EN Addr Sel] must be set to 1 "Parameters".

Values	Default:	0
	Min/Max:	0/255
	Display:	1

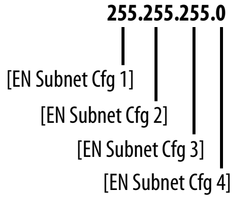
Communications Group *(continued)*

C133 [EN Subnet Cfg 1]
C134 [EN Subnet Cfg 2]
C135 [EN Subnet Cfg 3]
C136 [EN Subnet Cfg 4]

Related Parameter(s): C128

PF 525 PowerFlex 525 only.

Sets the bytes of the subnet mask. A reset or power cycle is required after selection is made.


255.255.255.0
[EN Subnet Cfg 1]
[EN Subnet Cfg 2]
[EN Subnet Cfg 3]
[EN Subnet Cfg 4]

IMPORTANT C128 [EN Addr Sel] must be set to 1 “Parameters”.

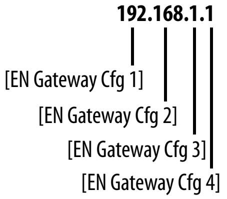
Values		
	Default:	0
	Min/Max:	0/255
	Display:	1

C137 [EN Gateway Cfg 1]
C138 [EN Gateway Cfg 2]
C139 [EN Gateway Cfg 3]
C140 [EN Gateway Cfg 4]

Related Parameter(s): C128

PF 525 PowerFlex 525 only.

Sets the bytes of the gateway address. A reset or power cycle is required after selection is made.


192.168.1.1
[EN Gateway Cfg 1]
[EN Gateway Cfg 2]
[EN Gateway Cfg 3]
[EN Gateway Cfg 4]

IMPORTANT C128 [EN Addr Sel] must be set to 1 “Parameters”.

Values		
	Default:	0
	Min/Max:	0/255
	Display:	1

C141 [EN Rate Cfg]

PF 525 PowerFlex 525 only.

Sets the network data rate at which EtherNet/IP communicates. A reset or power cycle is required after selection is made.

Options		
	0	“Auto detect” (Default)
	1	“10Mbps Full”
	2	“10Mbps Half”
	3	“100Mbps Full”
	4	“100Mbps Half”

Communications Group *(continued)*

C143 [EN Comm Flt Actn]

Related Parameter(s): P045, C145, C146, C147-C150

PF 525 PowerFlex 525 only.

Sets the action that the EtherNet/IP interface and drive takes if the EtherNet/IP interface detects that Ethernet communications have been disrupted.

IMPORTANT This setting is effective only if I/O that controls the drive is transmitted through the EtherNet/IP interface.

⚠ **ATTENTION:** Risk of injury or equipment damage exists. Parameter C143 [EN Comm Flt Actn] lets you determine the action of the EtherNet/IP interface and connected drive if communications are disrupted. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected drive).

Options	0	"Fault" (Default)	
	1	"Stop"	Drive stops per P045 [Stop Mode] setting.
	2	"Zero Data"	Note: The Reference and Datalink values transmitted to the drive will be set to "0".
	3	"Hold Last"	Note: The Logic Command, Reference, and Datalink values transmitted to the drive will be held at their last value.
	4	"Send Flt Cfg"	Note: The Logic Command, Reference, and Datalink values will be transmitted to the drive as configured in C145, C146, and C147…C150.

C144 [EN Idle Flt Actn]

Related Parameter(s): P045, C145, C146, C147-C150

PF 525 PowerFlex 525 only.

Sets the action that the EtherNet/IP interface and drive takes if the EtherNet/IP interface detects that the scanner is idle because the controller was switched to program mode.

⚠ **ATTENTION:** Risk of injury or equipment damage exists. Parameter C144 [EN Idle Flt Actn] lets you determine the action of the EtherNet/IP interface and connected drive if the scanner is idle. By default, this parameter faults the drive. you can set this parameter so that the drive continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected drive).

Options	0	"Fault" (Default)	
	1	"Stop"	Drive stops per P045 [Stop Mode] setting.
	2	"Zero Data"	Note: The Reference and Datalink values transmitted to the drive will be set to "0".
	3	"Hold Last"	Note: The Logic Command, Reference, and Datalink values transmitted to the drive will be held at their last value.
	4	"Send Flt Cfg"	Note: The Logic Command, Reference, and Datalink values will be transmitted to the drive as configured in C145, C146, and C147…C150.

C145 [EN Flt Cfg Logic]

Related Parameter(s): C143, C144

32 32 bit parameter.

PF 525 PowerFlex 525 only.

Sets the Logic Command data that is sent to the drive if any of the following is true:

– C143 [EN Comm Flt Actn] is set to 4 "Send Flt Cfg" and communications are disrupted.
– C144 [EN Idle Flt Actn] is set to 4 "Send Flt Cfg" and the scanner is put into Program or Test mode.

See Writing (06) Logic Command Data on page 191 for more information.

Values	Default:	0000
	Min/Max:	0000/FFFF
	Display:	0000

Communications Group *(continued)*

C146 [EN Flt Cfg Ref] Related Parameter(s): C143, C144

32 32 bit parameter.

PF 525 PowerFlex 525 only.

Sets the Reference data that is sent to the drive if any of the following is true:

– C143 [EN Comm Flt Actn] is set to 4 "Send Flt Cfg" and communications are disrupted.
– C144 [EN Idle Flt Actn] is set to 4 "Send Flt Cfg" and the scanner is put into Program or Test mode.

Values	Default:	0
	Min/Max:	0/50000
	Display:	1

C147 [EN Flt Cfg DL 1]
C148 [EN Flt Cfg DL 2]
C149 [EN Flt Cfg DL 3]
C150 [EN Flt Cfg DL 4]

PF 525 PowerFlex 525 only.

Sets the Ethernet Datalink Input data that is sent to the drive if any of the following is true:

– C143 [EN Comm Flt Actn] is set to 4 "Send Flt Cfg" and communications are disrupted.
– C144 [EN Idle Flt Actn] is set to 4 "Send Flt Cfg" and the scanner is put into Program or Test mode.

Values	Default:	0
	Min/Max:	0/65535
	Display:	1

C153 [EN Data In 1]
C154 [EN Data In 2]
C155 [EN Data In 3]
C156 [EN Data In 4]

PF 525 PowerFlex 525 only.

Datalink parameter number whose value is written from the embedded EtherNet/IP data table. This parameter cannot be changed when an I/O connection is established through the drive's embedded EtherNet/IP port.

Values	Default:	0
	Min/Max:	0/800
	Display:	1

C157 [EN Data Out 1]
C158 [EN Data Out 2]
C159 [EN Data Out 3]
C160 [EN Data Out 4]

PF 525 PowerFlex 525 only.

Datalink parameter number whose value is read from the embedded EtherNet/IP data table. This parameter cannot be changed when an I/O connection is established through the drive's embedded EtherNet/IP port.

Values	Default:	0
	Min/Max:	0/800
	Display:	1

Communications Group *(continued)*

C161 [Opt Data In 1]
C162 [Opt Data In 2]
C163 [Opt Data In 3]
C164 [Opt Data In 4]

Datalink parameter number whose value is written from the High Speed Drive Serial Interface (HSDSI) data table. This parameter cannot be changed when an I/O connection is established through the communication adapter.

Values	Default:	0
	Min/Max:	0/800
	Display:	1

C165 [Opt Data Out 1]
C166 [Opt Data Out 2]
C167 [Opt Data Out 3]
C168 [Opt Data Out 4]

Datalink parameter number whose value is read from the HSDSI data table. This parameter cannot be changed when an I/O connection is established through the communication adapter.

Values	Default:	0
	Min/Max:	0/800
	Display:	1

C169 [MultiDrv Sel]

Sets the configuration of the drive that is in multi-drive mode. A reset or power cycle is required after selection is made.

Options	0 “Disabled” (Default)	No multi-drive master from the internal network option module or embedded Ethernet port. The drive can still function as a multi-drive slave or as a single drive (no multi-drive used).
	1 “Network Opt”	Multi-drive is enabled with the internal network option as a multi-drive master. The host drive is “Drive 0” and up to four slave drives can be daisy-chained from its RS485 port.
	2 “EtherNet/IP”(1)	Multi-drive is enabled with the embedded Ethernet port as the multi-drive master. The host drive is “Drive 0” and up to four slave drives can be daisy-chained from its RS485 port.

(1) Setting is specific to PowerFlex 525 drives only.

C171 [Drv 1 Addr]
C172 [Drv 2 Addr]
C173 [Drv 3 Addr]
C174 [Drv 4 Addr]

Related Parameter(s): C169

Sets the corresponding node addresses of the daisy-chained drives when C169 [MultiDrv Sel] is set to 1 “Network Opt” or 2 “EtherNet/IP”. A reset or power cycle is required after selection is made.

Values	Default: Drv 1 Addr: Drv 2 Addr: Drv 3 Addr: Drv 4 Addr:	 2 3 4 5
	Min/Max:	1/247
	Display:	1

C175 [DSI I/O Cfg]

Sets the configuration of the Drives that are active in the multi-drive mode. Identifies the connections that would be attempted on a reset or power cycle. A reset or power cycle is required after selection is made.

Options	0 “Drive 0” (Default)
	1 “Drive 0-1”
	2 “Drive 0-2”
	3 “Drive 0-3”
	4 “Drive 0-4”

Logic Group

L180 [Stp Logic 0] **L181 [Stp Logic 1]**
L182 [Stp Logic 2] **L183 [Stp Logic 3]**
L184 [Stp Logic 4] **L185 [Stp Logic 5]**
L186 [Stp Logic 6] **L187 [Stp Logic 7]**

Related Parameter(s):

○ Stop drive before changing this parameter.

PF 525 PowerFlex 525 only.

Values	Default:	00F1
	Min/Max:	0000/FAFF
	Display	0001

See Appendix D and Appendix E for more information on applying Step Logic and Position StepLogic.

Parameters L180...L187 are only active if P047, P049, or P051 [Speed Referencex] is set to 13 "Step Logic" or 16 "Positioning". These parameters can be used to create a custom profile of frequency commands. Each "step" can be based on time, status of a Logic input or a combination of time and the status of a Logic input.

Digits 1...4 for each [Stp Logic x] parameter must be programmed according to the desired profile. A Logic input is established by setting a digital input, parameters t062, t063, t065...t068 [DigIn TermBlk xx] to 24 "Logic In 1" and/or 25 "Logic In 2" or by using Bits 6 and 7 of A560 [Enh Control Word].

A time interval between steps can be programmed using parameters L190...L197 [Stp Logic Time x]. See the table below for related parameters.

The speed for any step is programmed using parameters A410...A417 [Preset Freq x].

Step	StepLogic Parameter	Related Preset Frequency Parameter (Can be activated independent of StepLogic Parameters)	Related StepLogic Time Parameter (Active when L180...L187 Digit 1 or 2 are set to 1, b, C, d or E)
0	L180 [Stp Logic 0]	A410 [Preset Freq 0]	L190 [Stp Logic Time 0]
1	L181 [Stp Logic 1]	A411 [Preset Freq 1]	L191 [Stp Logic Time 1]
2	L182 [Stp Logic 2]	A412 [Preset Freq 2]	L192 [Stp Logic Time 2]
3	L183 [Stp Logic 3]	A413 [Preset Freq 3]	L193 [Stp Logic Time 3]
4	L184 [Stp Logic 4]	A414 [Preset Freq 4]	L194 [Stp Logic Time 4]
5	L185 [Stp Logic 5]	A415 [Preset Freq 5]	L195 [Stp Logic Time 5]
6	L186 [Stp Logic 6]	A416 [Preset Freq 6]	L196 [Stp Logic Time 6]
7	L187 [Stp Logic 7]	A417 [Preset Freq 7]	L197 [Stp Logic Time 7]

The position for any step is programmed using parameters L200...L214 [Step Units x].

Step	StepLogic Position Parameter
0	L200 [Step Units 0] & L201 [Step Units F 0]
1	L202 [Step Units 1] & L203 [Step Units F 1]
2	L204 [Step Units 2] & L205 [Step Units F 2]
3	L206 [Step Units 3] & L207 [Step Units F 3]
4	L208 [Step Units 4] & L209 [Step Units F 4]
5	L210 [Step Units 5] & L211 [Step Units F 5]
6	L212 [Step Units 6] & L213 [Step Units F 6]
7	L214 [Step Units 7] & L215 [Step Units F 7]

How StepLogic Works

The StepLogic sequence begins with a valid start command. A normal sequence always begins with L180 [Stp Logic 0].

Digit 1: Logic for next step

This digit defines the logic for the next step. When the condition is met the program advances to the next step. Step 0 follows Step 7. Example: Digit 1 is set to 3. When "Logic In 2" becomes active, the program advances to the next step.

Digit 2: Logic to jump to a different step

For all settings other than F, when the condition is met, the program overrides Digit 0 and jumps to the step defined by Digit 3.

Digit 3: Different step to jump

When the condition for Digit 2 is met, this digit setting determines the next step or to end the program.

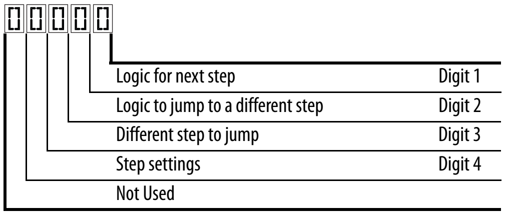
Digit 4: Step settings

This digit defines additional characteristics of each step.

Any StepLogic parameter can be programmed to control a relay or opto output, but you can not control different outputs based on the condition of different StepLogic commands.

StepLogic Settings

The logic for each function is determined by the four digits for each StepLogic parameter. The following is a listing of the available settings for each digit. See Appendix D for more information.


Logic for next step Digit 1
Logic to jump to a different step Digit 2
Different step to jump Digit 3
Step settings Digit 4
Not Used

Velocity Control Settings (Digit 4)

Required Setting	Accel/Decel Param. Used	StepLogic Output State	Commanded Direction
0	Accel/Decel 1	Off	FWD
1	Accel/Decel 1	Off	REV
2	Accel/Decel 1	Off	No Output
3	Accel/Decel 1	On	FWD
4	Accel/Decel 1	On	REV
5	Accel/Decel 1	On	No Output
6	Accel/Decel 2	Off	FWD
7	Accel/Decel 2	Off	REV
8	Accel/Decel 2	Off	No Output
9	Accel/Decel 2	On	FWD
A	Accel/Decel 2	On	REV
b	Accel/Decel 2	On	No Output

Positioning Settings (Digit 4)

Required Setting	Accel/Decel Param. Used	StepLogic Output State	Direction From Home	Type of Command
0	Accel/Decel 1	Off	FWD	Absolute
1	Accel/Decel 1	Off	FWD	Incremental
2	Accel/Decel 1	Off	REV	Absolute
3	Accel/Decel 1	Off	REV	Incremental
4	Accel/Decel 1	On	FWD	Absolute
5	Accel/Decel 1	On	FWD	Incremental
6	Accel/Decel 1	On	REV	Absolute
7	Accel/Decel 1	On	REV	Incremental
8	Accel/Decel 2	Off	FWD	Absolute
9	Accel/Decel 2	Off	FWD	Incremental
A	Accel/Decel 2	Off	REV	Absolute
b	Accel/Decel 2	Off	REV	Incremental
C	Accel/Decel 2	On	FWD	Absolute
d	Accel/Decel 2	On	FWD	Incremental
E	Accel/Decel 2	On	REV	Absolute
F	Accel/Decel 2	On	REV	Incremental

Settings (Digit 3)

Setting	Description
0	Jump to Step 0
1	Jump to Step 1
2	Jump to Step 2
3	Jump to Step 3
4	Jump to Step 4
5	Jump to Step 5
6	Jump to Step 6
7	Jump to Step 7
8	End Program (Normal Stop)
9	End Program (Coast to Stop)
A	End Program and Fault (F2)

Settings (Digit 2 and 1)

Setting	Description
0	Skip Step (Jump Immediately)
1	Step Based on [Stp Logic Time x]
2	Step if "Logic In 1" is Active
3	Step if "Logic In 2" is Active
4	Step if "Logic In 1" is Not Active
5	Step if "Logic In 2" is Not Active
6	Step if either "Logic In 1" or "Logic In 2" is Active
7	Step if both "Logic In 1" and "Logic In 2" are Active
8	Step if neither "Logic In 1" nor "Logic In 2" is Active
9	Step if "Logic In 1" is Active and "Logic In 2" is Not Active
A	Step if "Logic In 2" is Active and "Logic In 1" is Not Active
b	Step after [Stp Logic Time x] and "Logic In 1" is Active
C	Step after [Stp Logic Time x] and "Logic In 2" is Active
d	Step after [Stp Logic Time x] and "Logic In 1" is Not Active
E	Step after [Stp Logic Time x] and "Logic In 2" is Not Active
F	Do Not Step/Ignore Digit 2 Settings

Logic Group *(continued)*

L190 [Stp Logic Time 0] **L191 [Stp Logic Time 1]**
L192 [Stp Logic Time 2] **L193 [Stp Logic Time 3]**
L194 [Stp Logic Time 4] **L195 [Stp Logic Time 5]**
L196 [Stp Logic Time 6] **L197 [Stp Logic Time 7]**

PF 525 PowerFlex 525 only.

Sets the time to remain in each step if the corresponding command word is set to “Step based on time”.

Values	Default:	30.0 s
	Min/Max:	0.0/999.9 s
	Display:	0.1 s

L200 [Step Units 0] **L202 [Step Units 1]**
L204 [Step Units 2] **L206 [Step Units 3]**
L208 [Step Units 4] **L210 [Step Units 5]**
L212 [Step Units 6] **L214 [Step Units 7]**

32 32 bit parameter.

PF 525 PowerFlex 525 only.

Sets the position in user-defined units the drive must reach at each step.

Values	Default:	0
	Min/Max:	0/6400
	Display:	1

Advanced Display Group

d360 [Analog In 0-10V]

Related Parameter(s): t091, t092

Displays the 0-10V analog input as a percent of full scale.

Values	Default:	Read Only
	Min/Max:	0.0/100.0%
	Display:	0.1%

d361 [Analog In 4-20mA]

Related Parameter(s): t095, t096

Displays the 4-20 mA analog input as a percent of full scale.

Values	Default:	Read Only
	Min/Max:	0.0/100.0%
	Display:	0.1%

d362 [Elapsed Time-hr]

Related Parameter(s): A555

Displays the total elapsed powered-up time (in hours) since timer reset. The timer stops when it reaches the maximum value.

Values	Default:	Read Only
	Min/Max:	0/32767 hr
	Display:	1 hr

d363 [Elapsed Time-min]

Related Parameter(s): d362, A555

Displays the total elapsed powered-up time (in minutes) since timer reset. Resets to zero when maximum value is reached and increments d362 [Elapsed Time-hr] by one.

Values	Default:	Read Only
	Min/Max:	0.0/60.0 min
	Display:	0.1 min

d364 [Counter Status]

Displays the current value of the counter if enabled.

Values	Default:	Read Only
	Min/Max:	0/65535
	Display:	1

d365 [Timer Status]

32 32 bit parameter.

Displays the current value of the timer if enabled.

Values	Default:	Read Only
	Min/Max:	0/9999 s
	Display:	1 s

d367 [Drive Type]

Used by Rockwell Automation field service personnel.

Values	Default:	Read Only
	Min/Max:	0/65535
	Display:	1

Advanced Display Group *(continued)*

d368 [Testpoint Data] Related Parameter(s): A483

Displays the present value of the function selected in A483 [Testpoint Sel].

Values	Default:	Read Only
	Min/Max:	0/FFFF
	Display:	1

d369 [Motor OL Level]

Displays the motor overload counter.

Values	Default:	Read Only
	Min/Max:	0.0/150.0%
	Display:	0.1%

d375 [Slip Hz Meter] Related Parameter(s): P032

Displays the current amount of slip or droop (absolute value) being applied to the motor frequency. Drives applies slip based on the setting for P032 [Motor NP Hertz].

Values	Default:	Read Only
	Min/Max:	0.0/25.0 Hz
	Display:	0.1 Hz

d376 [Speed Feedback]

32 32 bit parameter.

Displays the value of the actual motor speed whether measured by encoder/pulse train feedback or estimated.

Values	Default:	Read Only
	Min/Max:	0/64000 rpm
	Display:	1 rpm

d378 [Encoder Speed]

32 32 bit parameter.

PF 525 PowerFlex 525 only.

Provides a monitoring point that reflects the speed measured from the feedback device. This shows the encoder or pulse train speed even if not used directly to control motor speed.

Values	Default:	Read Only
	Min/Max:	0/64000 rpm
	Display:	1 rpm

d380 [DC Bus Ripple]

Displays the real-time value of the DC bus ripple voltage.

Values	Default:	Read Only
	Min/Max:	0/410VDC for 230V AC drives; 820VDC for 460VAC drives; 1025VDC for 600VAC drives
	Display:	1V DC

d381 [Output Powr Fctr]

Displays the angle in electrical degrees between motor voltage and motor current.

Values	Default:	Read Only
	Min/Max:	0.0/180.0 deg
	Display:	0.1 deg

Advanced Display Group *(continued)*

d382 [Torque Current]

Displays the current value of the motor torque current measured by the drive.

Values	Default:	Read Only
	Min/Max:	0.00/(Drive Rated Amps x 2)
	Display:	0.01 A

d383 [PID1 Fdbk Displ]

d385 [PID2 Fdbk Displ]

PF 525 PowerFlex 525 only.

Displays the active PID Feedback value.

Values	Default:	Read Only
	Min/Max:	0.0/100.0%
	Display:	0.1%

d384 [PID1 Setpnt Displ]

d386 [PID2 Setpnt Displ]

PF 525 PowerFlex 525 only.

Displays the active PID Setpoint value.

Values	Default:	Read Only
	Min/Max:	0.0/100.0%
	Display:	0.1%

d387 [Position Status]

PF 525 PowerFlex 525 only.

Displays the present operating condition of the drive. When in Positioning mode, Bit 1 indicates positive or negative position in relation to Home.

1 = Condition True, 0 = Condition False	
Dir Positive	Digit 1
At Position	Digit 2
At Home	Digit 3
Drive Homed	Digit 4
Not Used	

Values	Default:	Read Only
	Min/Max:	0000/1111
	Display:	0000

d388 [Units Traveled H]

Related Parameter(s): d387

Stop drive before changing this parameter.

32 32 bit parameter.

PF 525 PowerFlex 525 only.

Displays the number of user-defined units traveled from the home position. See d387 [Position Status] for direction of travel.

Values	Default:	Read Only
	Min/Max:	0/64000
	Display:	1

Advanced Display Group *(continued)*

d389 [Units Traveled L] Related Parameter(s): d387

Stop drive before changing this parameter.

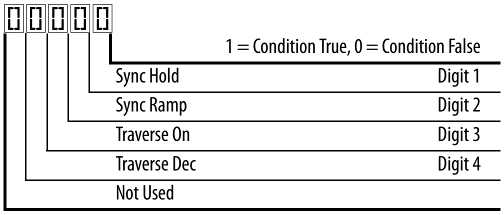
PF 525 PowerFlex 525 only.

Displays the number of user-defined units traveled from the home position. See d387 [Position Status] for direction of travel.

Values	Default:	Read Only
	Min/Max:	0.00/0.99
	Display:	0.01

d390 [Fiber Status]

Present status of the Fibers features.



1 = Condition True, 0 = Condition False

Sync Hold	Digit 1
Sync Ramp	Digit 2
Traverse On	Digit 3
Traverse Dec	Digit 4
Not Used	

Values	Default:	Read Only
	Min/Max:	0000/1111
	Display:	0000

d391 [Stp Logic Status] Related Parameter(s): P047, L180-L187

32 32 bit parameter.

PF 525 PowerFlex 525 only.

Displays the current step of the Step Logic profile as defined by parameters L180...L187 [Step Logic x] when P047 [Speed Reference1] is set to 13 "Step Logic" or 16 "Positioning".

Values	Default:	Read Only
	Min/Max:	0/8
	Display:	1

Advanced Program Group

A410 [Preset Freq 0] **A411 [Preset Freq 1]**
A412 [Preset Freq 2] **A413 [Preset Freq 3]**
A414 [Preset Freq 4] **A415 [Preset Freq 5]**
A416 [Preset Freq 6] **A417 [Preset Freq 7]**

A418 [Preset Freq 8] **A419 [Preset Freq 9]**
A420 [Preset Freq 10] **A421 [Preset Freq 11]**
A422 [Preset Freq 12] **A423 [Preset Freq 13]**
A424 [Preset Freq 14] **A425 [Preset Freq 15]**
PF 525 PowerFlex 525 only.

Sets the frequency of the drive outputs to the programmed value when selected.

For PowerFlex 525

	Default Accel/Decel Used	**Preset Input 1 (DigIn TermBlk 05)**	**Preset Input 2 (DigIn TermBlk 06)**	**Preset Input 3 (DigIn TermBlk 07)**	**Preset Input 4 (DigIn TermBlk 08)**
Preset Setting 0[1]	1	0	0	0	0
Preset Setting 1	1	1	0	0	0
Preset Setting 2	2	0	1	0	0
Preset Setting 3	2	1	1	0	0
Preset Setting 4	1	0	0	1	0
Preset Setting 5	1	1	0	1	0
Preset Setting 6	2	0	1	1	0
Preset Setting 7	2	1	1	1	0
Preset Setting 8	1	0	0	0	1
Preset Setting 9	1	1	0	0	1
Preset Setting 10	2	0	1	0	1
Preset Setting 11	2	1	1	0	1
Preset Setting 12	1	0	0	1	1
Preset Setting 13	1	1	0	1	1
Preset Setting 14	2	0	1	1	1
Preset Setting 15	2	1	1	1	1

For PowerFlex 523

	Default Accel/Decel Used	**Preset Input 1 (DigIn TermBlk 05)**	**Preset Input 2 (DigIn TermBlk 06)**	**Preset Input 3 (DigIn TermBlk 03)**	**–**
Preset Setting 0[1]	1	0	0	0	–
Preset Setting 1	1	1	0	0	
Preset Setting 2	2	0	1	0	
Preset Setting 3	2	1	1	0	
Preset Setting 4	1	0	0	1	
Preset Setting 5	1	1	0	1	
Preset Setting 6	2	0	1	1	
Preset Setting 7	2	1	1	1	

[1] Preset Setting 0 is only available if P047, P049 or P051 [Speed Referencex] is set to 7 “Preset Freq”.

Values	Defaults:	
	Preset Freq 0:	0.00 Hz
	Preset Freq 1:	5.00 Hz
	Preset Freq 2:	10.00 HZ
	Preset Freq 3:	20.00 Hz
	Preset Freq 4:	30.00 Hz
	Preset Freq 5:	40.00 Hz
	Preset Freq 6:	50.00 Hz
	Preset Freq 7…15:	60.00 Hz
	Min/Max:	0.00/500.00 Hz
	Display:	0.01 Hz

Advanced Program Group *(continued)*

A426 [Keypad Freq]

Related Parameter(s): P047, P049, P051

Provides the drive frequency command using the built-in keypad navigation. When P047, P049 or P051 [Speed Referencex] selects 2 "Keypad Freq", the value set in this parameter controls the frequency of the drive. The value of this parameter can also be changed when navigating with the keypad by pressing the Up or Down arrow keys.

Values	Default:	60.00 Hz
	Min/Max:	0.00/500.00 Hz
	Display:	0.01 Hz

A427 [MOP Freq]

Provides the drive frequency command using the built-in Motor Operated Potentiometer (MOP).

IMPORTANT Frequency is not written to non-volatile storage until drive is powered-down. If both MOP Up and MOP Down are applied at the same time, the inputs are ignored and the frequency is unchanged.

Values	Default:	60.00 Hz
	Min/Max:	0.00/500.00 Hz
	Display:	0.01 Hz

A428 [MOP Reset Sel]

Determines if the current MOP reference command is saved on power down.

Options	0	"Zero MOP Ref"	Resets the MOP frequency to zero on power down and stop.
	1	"Save MOP Ref" (Default)	

A429 [MOP Preload]

Determines the operation of the MOP function.

Options	0	"No preload" (Default)	
	1	"Preload"	Bumpless Transfer: whenever MOP mode is selected, the current output value of the speed is loaded.

A430 [MOP Time]

Sets the rate of change of the MOP reference.

Values	Default:	10.0 s
	Min/Max:	0.1/600.0 s
	Display:	0.1 s

A431 [Jog Frequency]

Related Parameter(s): P044

Sets the output frequency when a jog command is issued.

Values	Default:	10.00 Hz
	Min/Max:	0.00/[Maximum Freq]
	Display:	0.01 Hz

A432 [Jog Accel/Decel]

Sets the acceleration and deceleration time used when in jog mode.

Values	Default:	10.00 s
	Min/Max:	0.01/600.00 s
	Display:	0.01 s

Advanced Program Group *(continued)*

A433 [Purge Frequency]

Related Parameter(s): t062, t063, t065-t068

Provides a fixed frequency command value when t062, t063, t065-t068 [DigIn TermBlk xx] is set to 40 "Purge".

Values	Default:	5.00 Hz
	Min/Max:	0.00/500.00 Hz
	Display:	0.01 Hz

A434 [DC Brake Time]

Related Parameter(s): P045, A435

Sets the length of time that DC brake current is "injected" into the motor.

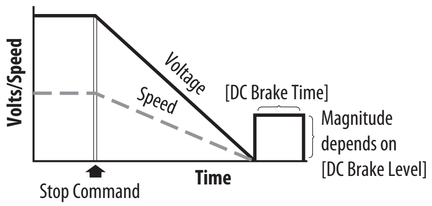
Values	Default:	0.0 s
	Min/Max:	0.0/99.9 s
	Display:	0.1 s

A435 [DC Brake Level]

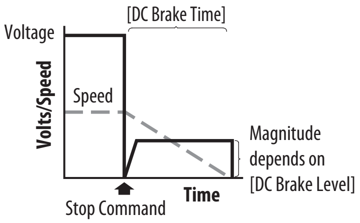
Related Parameter(s): P045

Defines the maximum DC brake current, in amps, applied to the motor when P045 [Stop Mode] is set to either 4 "Ramp" or 6 "DC Brake".

Ramp-to-Stop Mode


Volts/Speed
Voltage
Speed
[DC Brake Time]
Magnitude
depends on
[DC Brake Level]
Stop Command
Time

DC Injection Stop Mode


[DC Brake Time]
Voltage
Volts/Speed
Speed
Magnitude
depends on
[DC Brake Level]
Stop Command
Time

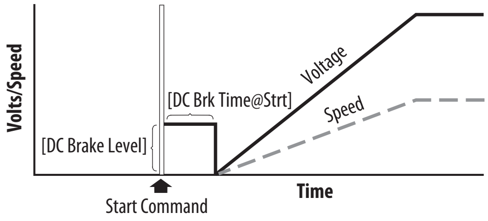
ATTENTION: If a hazard of injury due to movement of equipment or material exists, an auxiliary mechanical braking device must be used. This feature should not be used with synchronous motors. Motors may be demagnetized during braking.

Values	Default:	Drive Rated Amps x 0.5
	Min/Max:	0.0/(Drive Rated Amps x 1.8)
	Display:	0.1 A

A436 [DC Brk Time@Strt]

Related Parameter(s): P045, A435

Sets the length of time that DC brake current is "injected" into the motor after a valid start command is received.


Volts/Speed
[DC Brk Time@Strt]
Voltage
Speed
[DC Brake Level]
Start Command
Time

Values	Default:	0.0 s
	Min/Max:	0.0/99.9 s
	Display:	0.1 s

Advanced Program Group *(continued)*

A437 [DB Resistor Sel]

Stop drive before changing this parameter.

Enables/disables external dynamic braking and selects the level of resistor protection.

Options	0	"Disabled" (Default)	
	1	"Norml RA Res"	5%
	2	"NoProtection"	100%
	3…99	"3…99% DutyCycle"	

A438 [DB Threshold]

Related Parameter(s): A437

Sets the DC bus voltage threshold for Dynamic Brake operation. If DC bus voltage rises above this level, Dynamic Brake turns on. Lower values makes the dynamic braking function more responsive but may result in nuisance Dynamic Brake activation.

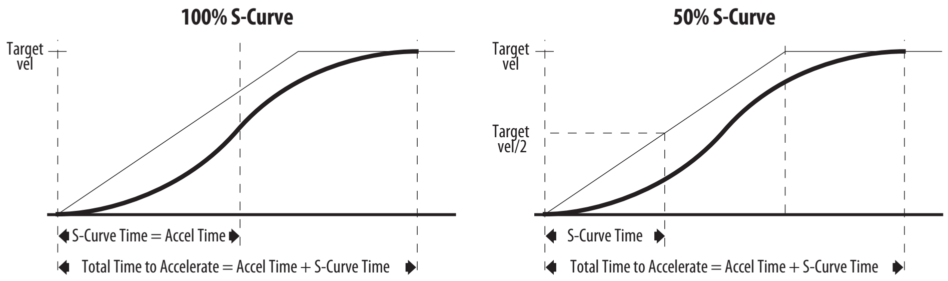
ATTENTION: Equipment damage may result if this parameter is set to a value that causes the dynamic braking resistor to dissipate excessive power. Parameter settings less than 100% should be carefully evaluated to ensure that the Dynamic Brake resistor's wattage rating is not exceeded. In general, values less than 90% are not needed. This parameter's setting is especially important if parameter A437 [DB Resistor Sel] is set to 2 "NoProtection".

Values	Default:	100.0%
	Min/Max:	10.0/110.0%
	Display:	0.1%

A439 [S Curve %]

Enables a fixed shape S-Curve that is applied to the acceleration and deceleration ramps (including jog).

S-Curve Time = (Accel or Decel Time) x (S-Curve Setting in percentage)



Example:

Accel Time = 10 s

S-Curve Setting = 30%

S-Curve Time = 10 x 0.3 = 3 s

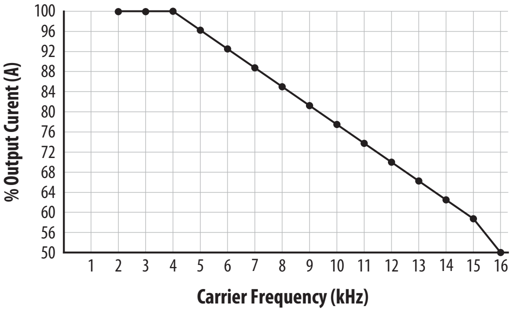
Values	Default:	0%
	Min/Max:	0/100%
	Display:	1%

Advanced Program Group *(continued)*

A440 [PWM Frequency]

Related Parameter(s): A540

Sets the carrier frequency for the PWM output waveform. The chart below provides derating guidelines based on the PWM frequency setting.



IMPORTANT Ignoring derating guidelines can cause reduced drive performance. The drive may automatically reduce the PWM carrier frequency at low output speeds, unless prevented from doing so by A540 [Var PWM Disable].

Values	Default:	4.0 kHz
	Min/Max:	2.0/16.0 kHz
	Display:	0.1 kHz

A441 [Droop Hertz@ FLA]

PF 525 PowerFlex 525 only.

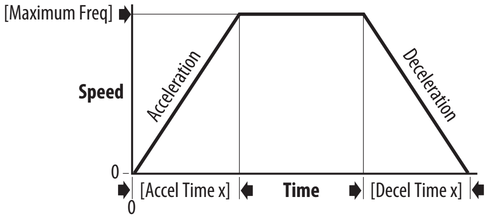
Reduces the frequency based on current. This frequency is subtracted from the commanded output frequency. Generally Slip and Droop would not both be used, but if both are enabled they simply subtract from each other. Typically used in load sharing schemes.

Values	Default:	0.0 Hz
	Min/Max:	0.0/10.0 Hz
	Display:	0.1 Hz

A442 [Accel Time 2]

Related Parameter(s): P044

Time for the drive to ramp from 0.0 Hz to P044 [Maximum Freq] if Accel Time 2 is selected.
Accel Rate = [Maximum Freq] / [Accel Time]



Values	Default:	10.00 s
	Min/Max:	0.00/600.00 s
	Display:	0.01 s

A443 [Decel Time 2]

Related Parameter(s): P044

Time for the drive to ramp from P044 [Maximum Freq] to 0.0 Hz if Decel Time 2 is selected.
Decel Rate = [Maximum Freq] / [Decel Time]

Values	Default:	10.00 s
	Min/Max:	0.00/600.00 s
	Display:	0.01 s

Advanced Program Group *(continued)*

A444 [Accel Time 3]
A446 [Accel Time 4]

Sets the rate of acceleration for all speed increases when selected by digital inputs.

Values	Default:	10.00 s
	Min/Max:	0.00/600.00 s
	Display:	0.01 s

A445 [Decel Time 3]
A447 [Decel Time 4]

Sets the rate of deceleration for all speed decreases when selected by digital inputs.

Values	Default:	10.00 s
	Min/Max:	0.00/600.00 s
	Display:	0.01 s

A448 [Skip Frequency 1]
A450 [Skip Frequency 2]
A452 [Skip Frequency 3]
A454 [Skip Frequency 4]
PF 525 PowerFlex 525 only.

Related Parameter(s): A449, A451, A453, A455

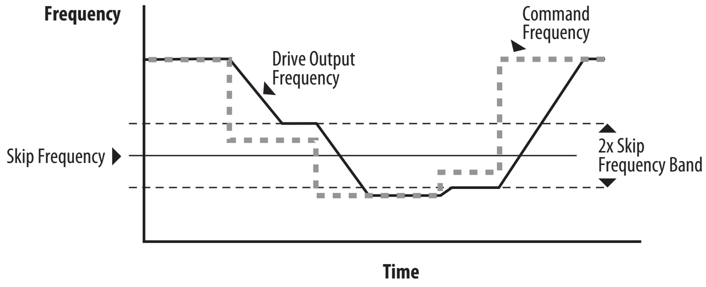
Works in conjunction with A449, A451, A453 and A455 [Skip Freq Band x] creating a range of frequencies at which the drive does not operate continuously.

Values	Default:	0.0 Hz (Disabled)
	Min/Max:	0.0/500.0 Hz
	Display:	0.1 Hz

A449 [Skip Freq Band 1]
A451 [Skip Freq Band 2]
A453 [Skip Freq Band 3]
A455 [Skip Freq Band 4]
PF 525 PowerFlex 525 only.

Related Parameter(s): A448, A450, A452, A454

Determines the band around A448, A450, A452 and A454 [Skip Frequency x].



Values	Default:	0.0 Hz
	Min/Max:	0.0/30.0 Hz
	Display:	0.1 Hz

Advanced Program Group *(continued)*

A456 [PID 1 Trim Hi]

A468 [PID 2 Trim Hi]

PF 525 PowerFlex 525 only.

Scales the upper value of the trim frequency when trim is active.

Values	Default:	60.0 Hz
	Min/Max:	0.0/500.0 Hz
	Display:	0.1 Hz

A457 [PID 1 Trim Lo]

A469 [PID 2 Trim Lo]

PF 525 PowerFlex 525 only.

Scales the lower value of the trim frequency when trim is active.

Values	Default:	0.0 Hz
	Min/Max:	0.0/500.0 Hz
	Display:	0.1 Hz

A458 [PID 1 Trim Sel]

A470 [PID 2 Trim Sel]

PF 525 PowerFlex 525 only.

Stop drive before changing this parameter.

Sets the PID output as trim to the source reference.

Options	0	"Disabled" (Default)	PID Trim is disabled.
	1	"TrimOn Pot"	
	2	"TrimOn Keypd"	
	3	"TrimOn DSI"	
	4	"TrimOn NetOp"	
	5	"TrimOn 0-10V"	
	6	"TrimOn 4-20"	
	7	"TrimOn Prset"	
	8	"TrimOn AnMlt"(1)	
	9	"TrimOn MOP"	
	10	"TrimOn Pulse"	
	11	"TrimOn Slgic"(1)	
	12	"TrimOn Encdr"(1)	
	13	"TrimOn ENet"(1)	

(1) Setting is specific to PowerFlex 525 drives only.

Advanced Program Group *(continued)*

A459 [PID 1 Ref Sel]

A471 [PID 2 Ref Sel]

PF 525 PowerFlex 525 only.

○ Stop drive before changing this parameter.

Selects the source of the PID reference.

Options	0	"PID Setpoint" (Default)
	1	"Drive Pot"
	2	"Keypad Freq"
	3	"Serial/DSI"
	4	"Network Opt"
	5	"0-10V Input"
	6	"4-20mA Input"
	7	"Preset Freq"
	8	"AnlgIn Multi"(1)
	9	"MOP Freq"
	10	"Pulse Input"
	11	"Step Logic"(1)
	12	"Encoder"(1)
	13	"EtherNet/IP"(1)

(1) Setting is specific to PowerFlex 525 drives only.

A460 [PID 1 Fdback Sel]

A472 [PID 2 Fdback Sel]

PF 525 PowerFlex 525 only.

Selects the source of the PID feedback.

Options	0	"0-10V Input" (Default)	Note: PID does not function with bipolar input. Negative voltages are ignored and treated as zero.
	1	"4-20mA Input"	
	2	"Serial/DSI"	
	3	"Network Opt"	
	4	"Pulse Input"	
	5	"Encoder"(1)	
	6	"EtherNet/IP"(1)	

(1) Setting is specific to PowerFlex 525 drives only.

A461 [PID 1 Prop Gain]

Related Parameter(s): A459, A471

A473 [PID 2 Prop Gain]

PF 525 PowerFlex 525 only.

Sets the value for the PID proportional component when the PID mode is enabled.

Values	Default:	0.01
	Min/Max:	0.00/99.99
	Display:	0.01

Advanced Program Group *(continued)*

A462 [PID 1 Integ Time] Related Parameter(s): A459, A471

A474 [PID 2 Integ Time]
PF 525 PowerFlex 525 only.

Sets the value for the PID integral component when PID mode is enabled.

Values	Default:	2.0 s
	Min/Max:	0.0/999.9 s
	Display:	0.1 s

A463 [PID 1 Diff Rate] Related Parameter(s): A459, A471

A475 [PID 2 Diff Rate]
PF 525 PowerFlex 525 only.

Sets the value (in 1/second) for the PID differential component when PID mode is enabled.

Values	Default:	0.00
	Min/Max:	0.00/99.99
	Display:	0.01

A464 [PID 1 Setpoint] Related Parameter(s): A459, A471

A476 [PID 2 Setpoint]
PF 525 PowerFlex 525 only.

Provides an internal fixed value for process setpoint when PID mode is enabled.

Values	Default:	0.0%
	Min/Max:	0.0/100.0%
	Display:	0.1%

A465 [PID 1 Deadband]

A477 [PID 2 Deadband]
PF 525 PowerFlex 525 only.

Sets the lower limit of the PID output.

Values	Default:	0.0%
	Min/Max:	0.0/10.0%
	Display:	0.1%

A466 [PID 1 Preload]

A478 [PID 2 Preload]
PF 525 PowerFlex 525 only.

Sets the value used to preload the integral component on start or enable.

Values	Default:	0.0 Hz
	Min/Max:	0.0/500.0 Hz
	Display:	0.1 Hz

A467 [PID 1 Invert Err]

A479 [PID 2 Invert Err]
PF 525 PowerFlex 525 only.

Changes the sign of the PID error.

Options	0	"Normal" (Default)
	1	"Inverted"

Advanced Program Group *(continued)*

A481 [Process Disp Lo] Related Parameter(s): b010, P043

Sets the value displayed in b010 [Process Display] when the drive is running at P043 [Minimum Freq].

Values	Default:	0.00
	Min/Max:	0.00/99.99
	Display:	0.01

A482 [Process Disp Hi] Related Parameter(s): b010, P044

Sets the value displayed in b010 [Process Display] when the drive is running at P044 [Maximum Freq].

Values	Default:	0.00
	Min/Max:	0.00/99.99
	Display:	0.01

A483 [Testpoint Sel]

Used by Rockwell Automation field service personnel.

Values	Default:	400
	Min/Max:	0/FFFF
	Display:	1

A484 [Current Limit 1] Related Parameter(s): P033

Maximum output current allowed before current limiting occurs.

Values	Default:	Drive Rated Amps x 1.1 (Normal Duty); Drive Rated Amps x 1.5 (Heavy Duty)
	Min/Max:	0.0/Drive Rated Amps x 1.5 (Normal Duty); Drive Rated Amps x 1.8 (Heavy Duty)
	Display:	0.1 A

A485 [Current Limit 2] Related Parameter(s): P033

PF 525 PowerFlex 525 only.

Maximum output current allowed before current limiting occurs.

Values	Default:	Drive Rated Amps x 1.1
	Min/Max:	0.0/Drive Rated Amps x 1.5 (Normal Duty); Drive Rated Amps x 1.8 (Heavy Duty)
	Display:	0.1 A

A486 [Shear Pin1 Level] Related Parameter(s): A487, A489

A488 [Shear Pin2 Level]

PF 525 PowerFlex 525 only.

Sets the value of current at which the shear pin fault occurs after the time set in A487, A489 [Shear Pin x Time]. Setting the value at 0.0 A disables this function.

Values	Default:	0.0 A (Disabled)
	Min/Max:	0.0/(Drive Rated Amps x 2)
	Display:	0.1 A

A487 [Shear Pin 1 Time] Related Parameter(s): A486, A488

A489 [Shear Pin 2 Time]

PF 525 PowerFlex 525 only.

Sets the continuous time the drive must be at or above the value set in A486, A488 [Shear Pinx Level] before a shear pin fault occurs.

Values	Default:	0.00 s
	Min/Max:	0.00/30.00 s
	Display:	0.01 s

Advanced Program Group *(continued)*

A490 [Load Loss Level]

Related Parameter(s): A491

PF 525 PowerFlex 525 only.

Provides a software trip (Load Loss fault) when the current drops below this level for the time specified in A491 [Load Loss Time].

Values	Default:	0.0 A
	Min/Max:	0.0/Drive Rated Amps
	Display:	0.1 A

A491 [Load Loss Time]

Related Parameter(s): A490

PF 525 PowerFlex 525 only.

Sets the required time for the current to be below A490 [Load Loss Level] before a Load Loss fault occurs.

Values	Default:	0 s
	Min/Max:	0/9999 s
	Display:	1 s

A492 [Stall Fault Time]

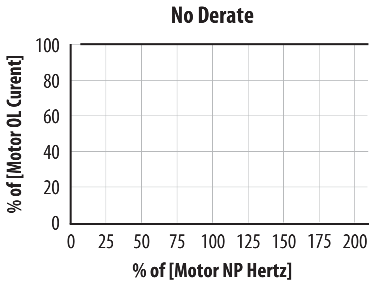
Sets the time that the drive remains in stall mode before a fault is issued.

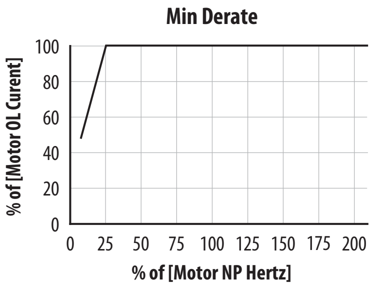
Options	0	"60 Seconds" (Default)
	1	"120 Seconds"
	2	"240 Seconds"
	3	"360 Seconds"
	4	"480 Seconds"
	5	"Flt Disabled"

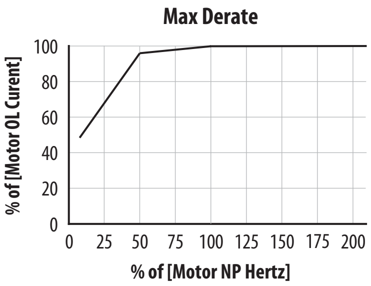
A493 [Motor OL Select]

Related Parameter(s): P032, P033

Drive provides Class 10 overload protection. Settings 0...2 select the derating factor for the I^2t overload function.







Options	0	"No Derate" (Default)
	1	"Min. Derate"
	2	"Max. Derate"

A494 [Motor OL Ret]

Selects whether the motor overload counter is saved on power-down or reset on power-up.

Options	0	"Reset" (Default)
	1	"Save"

Advanced Program Group *(continued)*

A495 [Drive OL Mode]

Determines how the drive handles overload conditions that would otherwise cause the drive to fault.

Options	0	"Disabled"
	1	"Reduce CLim"
	2	"Reduce PWM"
	3	"Both-PWM 1st" (Default)

A496 [IR Voltage Drop]

Related Parameter(s): P040

Value of volts dropped across the resistance of the motor stator (autotune) for induction motor.

Values	Default:	Based on Drive Rating
	Min/Max:	0.0/600.0VAC
	Display:	0.1VAC

A497 [Flux Current Ref]

Related Parameter(s): P040

This is the current necessary for full motor flux. The value should be set to the full speed no-load current of the motor.

Values	Default:	Based on Drive Rating
	Min/Max:	0.00/(Drive Rated Amps x 1.4)
	Display:	0.01 A

A498 [Motor Rr]

PF 525 PowerFlex 525 only.

Rotor resistance of induction motor.

Values	Default:	Based on Drive Rating
	Min/Max:	0.00/655.35 ohm
	Display:	0.01 ohm

A499 [Motor Lm]

PF 525 PowerFlex 525 only.

Mutual Inductance of induction motor.

Values	Default:	Based on Drive Rating
	Min/Max:	0.0/6553.5 mH
	Display:	0.1 mH

A500 [Motor Lx]

PF 525 PowerFlex 525 only.

Leakage Inductance of induction motor.

Values	Default:	Based on Drive Rating
	Min/Max:	0.0/6553.5 mH
	Display:	0.1 mH

A509 [Speed Reg Sel]

Related Parameter(s): A521, A522, A523, A524, A525, A526

PF 525 PowerFlex 525 only.

Determines if PI gain of the "Vector" control mode speed regulator is set automatically or manually. Parameters A521...A526 are set automatically by this parameter.

Options	0	"Automatic" (Default)
	1	"Manual"

Advanced Program Group *(continued)*

A510 [Freq 1]
A512 [Freq 2]
A514 [Freq 3]

PF 525 PowerFlex 525 only.

Sets the “Vector” control mode frequency.

Values	Default:	
	Freq 1:	8.33%
	Freq 2:	15.00%
	Freq 3:	20.00%
	Min/Max:	0.00/200.00%
	Display:	0.01%

A511 [Freq 1 BW]
A513 [Freq 2 BW]
A515 [Freq 3 BW]

PF 525 PowerFlex 525 only.

Speed control loop bandwidth for “Vector” control mode.

Values	Default:	10 Hz
	Min/Max:	0/40 Hz
	Display:	1 Hz

A521 [Freq 1 Kp] Related Parameter(s): A509, A510
A523 [Freq 2 Kp]
A525 [Freq 3 Kp]

PF 525 PowerFlex 525 only.

Sets P-gain of “Vector” control mode when in frequency region 1, 2 or 3 for faster speed response during dynamic-state where motor is still accelerating. If A509 [Speed Reg Sel] is set to 1 “Manual”, these parameters can be changed.

Values	Default:	100.0%
	Min/Max:	0.0/500.0%
	Display:	0.1%

A522 [Freq 1 Ki] Related Parameter(s): A509, A510
A524 [Freq 2 Ki]
A526 [Freq 3 Ki]

PF 525 PowerFlex 525 only.

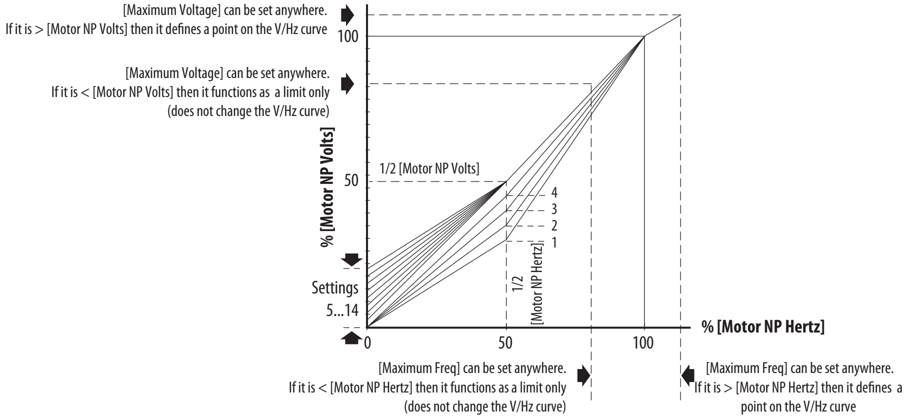
Sets I-gain of “Vector” control mode when in frequency region 1, 2 or 3 for faster speed response during steady-state where motor is at its rated speed. If A509 [Speed Reg Sel] is set to 1 “Manual”, these parameters can be changed.

Values	Default:	0.100 s
	Min/Max:	0.000/10.000 s
	Display:	0.001 s

Advanced Program Group *(continued)*

A530 [Boost Select] Related Parameter(s): b004, P031, P032, P039

Sets the boost voltage (% of P031 [Motor NP Volts]) and redefines the V/Hz curve. Only used for V/Hz and SVC control modes.

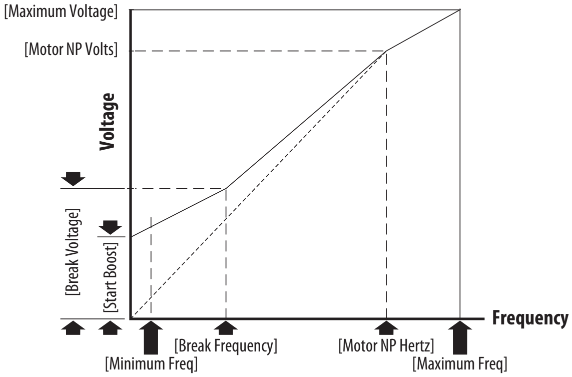


Options	0	"Custom V/Hz"	
	1	"30.0, VT"	Fan/Pump Curves (Variable Torque)
	2	"35.0, VT"	
	3	"40.0, VT"	
	4	"45.0, VT"	
	5	"0.0, no IR"	Boost Voltage (% of Base) (Constant Torque)
	6	"0.0" (Default for 400V and 600V drives, 5 HP and above)	
	7	"2.5, CT" (Default for 200V drives, 5 HP and above)	
	8	"5.0, CT" (Default for drives below 5 HP)	
	9	"7.5, CT"	
	10	"10.0, CT"	
	11	"12.5, CT"	
	12	"15.0, CT"	
	13	"17.5, CT"	
	14	"20.0, CT"	

Advanced Program Group *(continued)*

A531 [Start Boost] Related Parameter(s): P031, P032, P039, A530

Sets the boost voltage (% of P031 [Motor NP Volts]) and redefines the V/Hz curve when A530 [Boost Select] = 0 "Custom V/Hz" and P039 [Torque Perf Mode] = 0 "V/Hz".


[Maximum Voltage]
[Motor NP Volts]
Voltage
[Break Voltage]
[Start Boost]
Frequency
[Break Frequency]
[Motor NP Hertz]
[Minimum Freq]
[Maximum Freq]

Values	Default:	2.5%
	Min/Max:	0.0/25.0%
	Display:	0.1%

A532 [Break Voltage] Related Parameter(s): P031, P032, P039, A530, A533

Sets the voltage (in percent of [Base Frequency]) at the A533 [Break Frequency] if A530 [Boost Select] is set to 0 "Custom V/Hz".

Values	Default:	25.0%
	Min/Max:	0.0/100.0%
	Display:	0.1%

A533 [Break Frequency] Related Parameter(s): P031, P032, P039, A530, A532

Sets the frequency where A532 [Break Voltage] is applied if A530 [Boost Select] is set to 0 "Custom V/Hz".

Values	Default:	15.0 Hz
	Min/Max:	0.0/500.0 Hz
	Display:	0.1 Hz

A534 [Maximum Voltage] Related Parameter(s): b004

Sets the highest voltage the drive outputs.

Values	Default:	Drive Rated Volts
	Min:	10VAC (on 230VAC Drives); 20VAC (on 460VAC Drives); 25VAC (on 600VAC Drives)
	Max:	255VAC (on 230VAC Drives); 510VAC (on 460VAC Drives); 637.5VAC (on 600VAC Drives)
	Display:	1VAC

Advanced Program Group *(continued)*

A535 [Motor Fdbk Type]

Related Parameter(s): A537

○ Stop drive before changing this parameter.

PF 525 PowerFlex 525 only.

Selects the encoder type.

⚠ **ATTENTION:** The loss of analog input, encoder or other feedback may cause unintended speed or motion. Take appropriate precautions to guard against possible unintended speed or motion.

			Allowable Control Modes	Hardware Inputs
Options	0	"None" (Default)	For all motor types	–
	1	"Pulse Train"	All except Vector	Optional incremental encoder card (catalog number 25-ENC-1)
	2	"Single Chan"	All except Vector	
	3	"Single Check"	All except Vector	
	4	"Quadrature"	For all motor types	
	5	"Quad Check"	For all motor types	

A536 [Encoder PPR]

PF 525 PowerFlex 525 only.

Specifies the encoder Pulses Per Revolution (PPR) when an encoder is used.

Values	Default:	1024 PPR
	Min/Max:	0/20000 PPR
	Display:	1 PPR

A537 [Pulse In Scale]

Related Parameter(s): t065, t067, A535

Sets the scale factor/gain for the Pulse Input when t065 or t067 [DigIn TermBlk xx] is set to 52 "Pulse Train", or A535 [Motor Fdbk Type] is set to 1 "Pulse Train".
Input frequency (Hz) / Pulse in Scale = Output frequency (Hz)

Values	Default:	64
	Min/Max:	0/20000
	Display:	1

A538 [Ki Speed Loop]

PF 525 PowerFlex 525 only.

Sets the I-gain used in the PI calculation of the speed loop when feedback is used.

Values	Default:	2.0
	Min/Max:	0.0/400.0
	Display:	0.1

A539 [Kp Speed Loop]

PF 525 PowerFlex 525 only.

Sets the P-gain used in the PI calculation of the speed loop when feedback is used.

Values	Default:	5.0
	Min/Max:	0.0/200.0
	Display:	0.1

Advanced Program Group *(continued)*

A540 [Var PWM Disable] Related Parameter(s): A440

Stop drive before changing this parameter.

Enables/disables a feature that varies the carrier frequency for the PWM output waveform defined by A440 [PWM Frequency].

Options	0	"Enabled" (Default)
	1	"Disabled"

A541 [Auto Rstrt Tries] Related Parameter(s): A542

Sets the maximum number of times the drive attempts to reset a fault and restart. See Chapter 4 for more information on faults and fault codes.

Clear a Type 1 fault and restart the drive.

1. Set A541 [Auto Rstrt Tries] to a value other than "0".
2. Set A542 [Auto Rstrt Delay] to a value other than "0".

Clear an OverVoltage, UnderVoltage or Heatsink OvrTmp fault without restarting the drive.

1. Set A541 [Auto Rstrt Tries] to a value other than "0".
2. Set A542 [Auto Rstrt Delay] to "0".

ATTENTION: Equipment damage and/or personal injury may result if this parameter is used in an inappropriate application. Do not use this function without considering applicable local, national and international codes, standards, regulations or industry guidelines.

Values	Default:	0
	Min/Max:	0/9
	Display:	1

A542 [Auto Rstrt Delay] Related Parameter(s): A541

Sets the time between restart attempts if A541 [Auto Rstrt Tries] is not zero.

Values	Default:	1.0 s
	Min/Max:	0.0/120.0 s
	Display:	0.1 s

A543 [Start At PowerUp]

Stop drive before changing this parameter.

Enables/disables drive start on power up without a Start command being cycled. Requires a digital input configured for Run or Start and a valid start contact.

ATTENTION: Equipment damage and/or personal injury may result if this parameter is used in an inappropriate application. Do not use this function without considering applicable local, national and international codes, standards, regulations or industry guidelines.

Options	0	"Disabled" (Default)
	1	"Enabled"

A544 [Reverse Disable] Related Parameter(s): b006

Stop drive before changing this parameter.

Enables/disables the function that allows the direction of motor rotation to be changed.

Options	0	"Rev Enabled" (Default)
	1	"Rev Disabled"

A545 [Flying Start En]

Sets the condition that allows the drive to reconnect to a spinning motor at actual RPM.

Options	0	"Disabled" (Default)	
	1	"Enabled"	Catch and ramp to commanded speed at every drive start.

Advanced Program Group *(continued)*

A546 [FlyStrt CurLimit]

Used to determine when the drive has matched the motor frequency if flying start is enabled.

Values	Default:	150%
	Min/Max:	30/200%
	Display:	1%

A547 [Compensation]

Enables/disables correction options that may improve problems with motor instability.

Options	0	"Disabled"	No compensation.
	1	"Electrical" (Default)	Some drive/motor combinations have inherent instabilities which are exhibited as non-sinusodial motor currents. This setting attempts to correct this condition
	2	"Mechanical"	Some motor/load combinations have mechanical resonances which can be excited by the drive current regulator. This setting slows down the current regulator response and attempts to correct this condition.
	3	"Both"	

A548 [Power Loss Mode]

Sets the reaction to a loss of input power.

Options	0	"Coast" (Default)	Drive faults and motor coasts to a stop.
	1	"Decel"	Drive decelerates and attempts to keep the DC bus voltage above the undervoltage level.

A549 [Half Bus Enable]

Enables/disables the power ride through function which allows the drive to maintain power to the motor at 50% drive input voltage during short-term power sag conditions.

⚠ **ATTENTION:** To guard against drive damage, a minimum line impedance must be provided to limit inrush current when the power line recovers. The input impedance should be equal or greater than the equivalent of a 5% transformer with a VA rating 6 times the drive's input VA rating if Half Bus is enabled.

Options	0	"Disabled" (Default)
	1	"Enabled"

A550 [Bus Reg Enable]

Enables/disables the bus regulator.

Options	0	"Disabled"
	1	"Enabled" (Default)

A551 [Fault Clear]

⭘ Stop drive before changing this parameter.

Resets a fault and clears the fault queue.

Options	0	"Ready/Idle" (Default)	
	1	"Reset Fault"	Resets the active fault but does not clear any fault buffer.
	2	"Clear Buffer"	Resets the active fault and clears all fault buffers to "0".

A552 [Program Lock]

Related Parameter(s): A553

Protects parameters against change by unauthorized personnel with a 4-digit password.

Values	Default:	0000
	Min/Max:	0000/9999
	Display:	1111

Advanced Program Group *(continued)*

A553 [Program Lock Mod]

Related Parameter(s): A552

Determines the lock mode used in parameter A552 [Program Lock]. When set to 2 or 3, A552 [Program Lock] is added to the custom group to allow unlocking of parameters.

Options	0	"Full Lock" (Default)	All parameters are locked except [Program Lock].
	1	"Keypad Lock"	All parameters are locked except [Program Lock] from keypad access but can still be accessed over communications.
	2	"Custom Only"	All parameters are locked and hidden except custom group and [Program Lock].
	3	"KeyPd Custom"	All parameters are locked and hidden except custom group and [Program Lock] from keypad access but can still be accessed over communications.

A554 [Drv Ambient Sel]

Sets the maximum expected ambient of the drive when used above 50 °C. When ambient temperature is above 50 °C, the drive will apply necessary current derating.

Options	0	"Normal" (Default)	
	1	"55C"	
	2	"60C"	
	3	"65C +Fan Kit"	Fan kit required.
	4	"70C +Fan Kit"	

A555 [Reset Meters]

Related Parameter(s): b019, b021, b022, b023, b024, b025, b026, d362, d363

Resets the values stored in the parameters that track fault times and energy usage.

Options	0	"Ready/Idle" (Default)	
	1	"Reset Meters"	Resets kWh, MWh, Accum kWh, Cost, and CO2 Sav parameter values.
	2	"Reset Time"	Resets min, hr, and x10 hr.

A556 [Text Scroll]

Sets the scrolling speed of the text in the LCD display.

Options	0	"Off"	No scroll.
	1	"Low Speed"	
	2	"Mid Speed" (Default)	
	3	"High Speed"	

A557 [Out Phas Loss En]

Enable/disable output phase loss detection.

ATTENTION: Equipment damage and/or personal injury may result if this parameter is used in an inappropriate application. Do not use this function without considering applicable local, national and international codes, standards, regulations or industry guidelines.

Options	0	"Disable" (Default)
	1	"Enable"

A558 [Positioning Mode]

Stop drive before changing this parameter.

PF 525 PowerFlex 525 only.

Defines the positioning transition mode used for the position steps.

Options	0	"Time Steps" (Default)	Steps based on time.
	1	"Preset Input"	Preset inputs directly commands a given step.
	2	"Step Logic"	Use Step Logic Commands. Always start from Step 0.
	3	"Preset StpL"	Use Preset Inputs to determine starting step then Step Logic commands.
	4	"StpLogic-Lst"	Use Step Logic commands from last Step Logic step at last drive stop.

Advanced Program Group *(continued)*

A559 [Counts Per Unit]

PF 525 PowerFlex 525 only.

Sets the number of encoder counts equal to one user-defined unit.

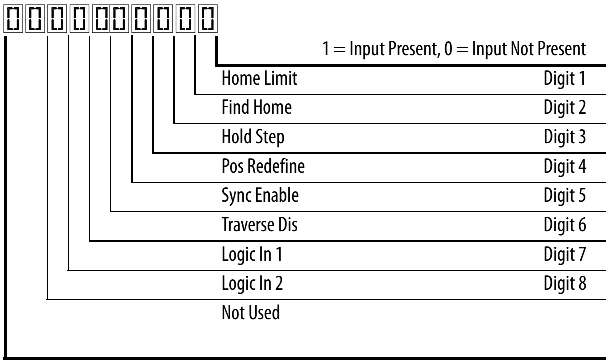
Values	Default:	4096
	Min/Max:	1/32000
	Display:	1

A560 [Enh Control Word]

Related Parameter(s): t062, t063, t065 - t068, A571

PF 525 PowerFlex 525 only.

Allows control of positioning and other functions through parameter control for use over comms. The functions replicate the digital input options and function in the same way.



1 = Input Present, 0 = Input Not Present

Home Limit	Digit 1
Find Home	Digit 2
Hold Step	Digit 3
Pos Redefine	Digit 4
Sync Enable	Digit 5
Traverse Dis	Digit 6
Logic In 1	Digit 7
Logic In 2	Digit 8
Not Used	

Values	Default:	0000 0000
	Min/Max:	0000 0000/1111 1111
	Display:	0000 0000
Digits	0 "Home Limit"	In Positioning mode, this indicates the drive is at the home position
	1 "Find Home"	When set, the next start command causes the drive to find home. Set this bit to 0 after completing the homing routine.
	2 "Hold Step"	In Positioning mode, this input over-rides other inputs and causes the drive to remain at its current step (running at zero speed once it reaches its position) until released.
	3 "Pos Redefine"	In Positioning mode, this input resets the home position to the current position of the machine. Set this bit to 0 after completing the homing routine.
	4 "Sync Enable"	Must be used in order to hold the existing frequency when Sync Time is set to enable speed synchronization. When this bit is reset to zero the drive accelerates to the new commanded frequency based on A571 [Sync Time] setting.
	5 "Traverse Dis"	When set the traverse function is disabled.
	6 "Logic In 1"	This provides an identical function as the "Logic In1" Digital Input option. This bit is logically ORed with a digital input t062, t063, t065-t068 [DigIn TermBlk xx] set to 24 "Logic In1". It can be used to move through the Step-Logic functions (speed or position) using comms control without requiring actual digital input transitions.
	7 "Logic In 2"	This provides and identical function as the "Logic In2" Digital Input option. This bit is logically ORed with a digital input t062, t063, t065-t068 [DigIn TermBlk xx] set to 25 "Logic In2". It can be used to move through the Step-Logic functions (speed or position) using comms control without requiring actual digital input transitions.

A561 [Home Save]

PF 525 PowerFlex 525 only.

Determines whether the current position is saved on power down.

Options	0 "Home Reset" (Default)	Position resets to zero on power up.
	1 "Home Saved"	

Advanced Program Group *(continued)*

A562 [Find Home Freq]

PF 525 PowerFlex 525 only.

Sets the maximum frequency the drive uses when "Find Home" is issued.

Values	Default:	10.0 Hz
	Min/Max:	0.1/500.0 Hz
	Display:	0.1 Hz

A563 [Find Home Dir]

Stop drive before changing this parameter.

PF 525 PowerFlex 525 only.

Sets the direction the drive commands when "Find Home" is issued.

Options	0	"Forward" (Default)
	1	"Reverse"

A564 [Encoder Pos Tol]

PF 525 PowerFlex 525 only.

Sets the "At Position" and the "At Home' tolerance around the encoder count. The value is added to and subtracted from the target encoder unit value to create the tolerance range.

Values	Default:	100
	Min/Max:	1/50000
	Display:	1

A565 [Pos Reg Filter]

PF 525 PowerFlex 525 only.

Sets the error signal filter in the position regulator.

Values	Default:	8
	Min/Max:	0/15
	Display:	1

A566 [Pos Reg Gain]

PF 525 PowerFlex 525 only.

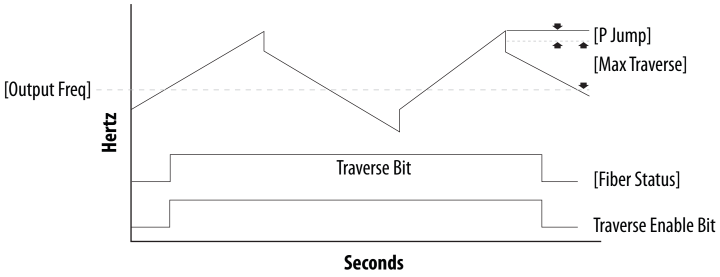
Sets the gain adjustment for the position regulator.

Values	Default:	3.0
	Min/Max:	0.0/200.0
	Display:	0.1

Advanced Program Group *(continued)*

A567 [Max Traverse]

Sets the amplitude of triangle wave speed modulation.


[P Jump]
[Max Traverse]
[Output Freq]
Hertz
Traverse Bit
[Fiber Status]
Traverse Enable Bit
Seconds

Values	Default:	0.00 Hz
	Min/Max:	0.00/300.00 Hz
	Display:	0.01 Hz

A568 [Traverse Inc]

Related Parameter(s): A567

Sets the time required for the Traverse function to accelerate from the minimum to the maximum traverse frequency. See the diagram at A567 [Max Traverse].

Values	Default:	0.00 s
	Min/Max:	0.00/300.00 s
	Display:	0.01 s

A569 [Traverse Dec]

Related Parameter(s): A567

Sets the time required for the Traverse function to decelerate from the maximum to the minimum traverse frequency. See the diagram at A567 [Max Traverse].

Values	Default:	0.00 s
	Min/Max:	0.00/300.00 s
	Display:	0.01 s

A570 [P Jump]

Related Parameter(s): A567

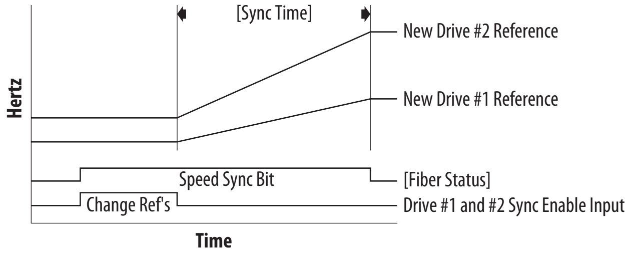
Sets the frequency amplitude that is added to or subtracted from the commanded frequency. See the diagram at A567 [Max Traverse].

Values	Default:	0.00 Hz
	Min/Max:	0.00/300.00 Hz
	Display:	0.01 Hz

A571 [Sync Time]

Related Parameter(s): t062, t063, t065 - t068, A560

Enables the function that holds the drive at the current frequency even if the commanded frequency changes. Used with t062, t063, t065-t068 [DigIn TermBlk xx] 32 "Sync Enable".


[Sync Time]
New Drive #2 Reference
New Drive #1 Reference
Hertz
Speed Sync Bit
[Fiber Status]
Change Ref's
Drive #1 and #2 Sync Enable Input
Time

Values	Default:	0.0 s
	Min/Max:	0.0/3200.0 s
	Display:	0.1 s

Advanced Program Group *(continued)*

A572 [Speed Ratio]

○ Stop drive before changing this parameter.

Scales the drive speed command.

Values	Default:	1.00
	Min/Max:	0.01/99.99
	Display:	0.01

Network Parameter Group

This group contains parameters for the network option card that is installed.

Refer to the network option card's user manual for more information on the available parameters.

Modified Parameter Group

This group contains parameters that have their values changed from the factory default.

When a parameter has its default value changed, it is automatically added to this group. When a parameter has its value changed back to the factory default, it is automatically removed from this group.

Fault and Diagnostic Group

Related Parameter(s): b007-b009

F604 [Fault 4 Code]
F605 [Fault 5 Code]
F606 [Fault 6 Code]
F607 [Fault 7 Code]
F608 [Fault 8 Code]
F609 [Fault 9 Code]
F610 [Fault10 Code]

A code that represents a drive fault. The codes appear in these parameters in the order they occur (b007 [Fault 1 Code] = the most recent fault). Repetitive faults are only recorded once.

Values	Default:	Read Only
	Min/Max:	F0/F127
	Display:	F0

Related Parameter(s): d362

F611 [Fault 1 Time-hr] **F612 [Fault 2 Time-hr]**
F613 [Fault 3 Time-hr] **F614 [Fault 4 Time-hr]**
F615 [Fault 5 Time-hr]

F616 [Fault 6 Time-hr] **F617 [Fault 7 Time-hr]**
F618 [Fault 8 Time-hr] **F619 [Fault 9 Time-hr]**
F620 [Fault10 Time-hr]
PF 525 PowerFlex 525 only.

Displays the value of d362 [Elapsed Time-hr] when the fault occurs.

Values	Default:	Read Only
	Min/Max:	0/32767 hr
	Display:	1 hr

Related Parameter(s): d363

F621 [Fault 1 Time-min] **F622 [Fault 2 Time-min]**
F623 [Fault 3 Time-min] **F624 [Fault 4 Time-min]**
F625 [Fault 5 Time-min]

F626 [Fault 6 Time-min] **F627 [Fault 7 Time-min]**
F628 [Fault 8 Time-min] **F629 [Fault 9 Time-min]**
F630 [Fault10 Time-min]
PF 525 PowerFlex 525 only.

Displays the value of d363 [Elapsed Time-min] when the fault occurs.

Values	Default:	Read Only
	Min/Max:	0.0/320.0 min
	Display:	0.1 min

Related Parameter(s): b001

F631 [Fault 1 Freq] **F632 [Fault 2 Freq]**
F633 [Fault 3 Freq] **F634 [Fault 4 Freq]**
F635 [Fault 5 Freq]

F636 [Fault 6 Freq] **F637 [Fault 7 Freq]**
F638 [Fault 8 Freq] **F639 [Fault 9 Freq]**
F640 [Fault10 Freq]
PF 525 PowerFlex 525 only.

Displays and stores the value of b001 [Output Freq] with the most recent 10 faults occurred.
[Fault 1 Freq] stores the most recent fault, [Fault 2 Freq] stores the second most recent fault and [Fault 3 Freq] stores the third most recent fault.

Values	Default:	Read Only
	Min/Max:	0.00/500.00 Hz
	Display:	0.01 Hz

Fault and Diagnostic Group *(continued)*

F641 [Fault 1 Current] **F642 [Fault 2 Current]**
F643 [Fault 3 Current] **F644 [Fault 4 Current]**
F645 [Fault 5 Current]

Related Parameter(s): b003

F646 [Fault 6 Current] **F647 [Fault 7 Current]**
F648 [Fault 8 Current] **F649 [Fault 9 Current]**
F650 [Fault10 Current]
PF 525 PowerFlex 525 only.

Displays and stores the value of b003 [Output Current] with the most recent 10 faults occurred.
[Fault 1 Current] stores the most recent fault, [Fault 2 Current] stores the second most recent fault and [Fault 3 Current] stores the third most recent fault.

Values	Default:	Read Only
	Min/Max:	0.00/(Drive Rated Amps x 2)
	Display:	0.01 A

F651 [Fault 1 BusVolts] **F652 [Fault 2 BusVolts]**
F653 [Fault 3 BusVolts] **F654 [Fault 4 BusVolts]**
F655 [Fault 5 BusVolts]

Related Parameter(s): b005

F656 [Fault 6 BusVolts] **F657 [Fault 7 BusVolts]**
F658 [Fault 8 BusVolts] **F659 [Fault 9 BusVolts]**
F660 [Fault10 BusVolts]
PF 525 PowerFlex 525 only.

Displays and stores the value of b005 [DC Bus Voltage] with the most recent 10 faults occurred.
[Fault 1 BusVolts] stores the most recent fault, [Fault2 BusVolts] stores the second most recent fault and [Fault 3 BusVolts] stores the third most recent fault.

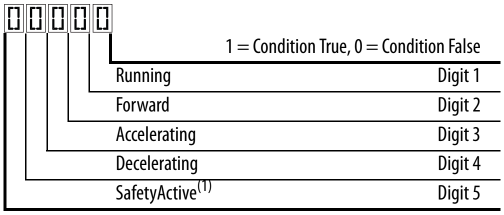
Values	Default:	Read Only
	Min/Max:	0/1200VDC
	Display:	1VDC

F661 [Status @ Fault 1] **F662 [Status @ Fault 2]**
F663 [Status @ Fault 3] **F664 [Status @ Fault 4]**
F665 [Status @ Fault 5]

Related Parameter(s): b006

F666 [Status @ Fault 6] **F667 [Status @ Fault 7]**
F668 [Status @ Fault 8] **F669 [Status @ Fault 9]**
F670 [Status @ Fault10]
PF 525 PowerFlex 525 only.

Displays the value of b006 [Drive Status] with the most recent 10 faults occurred.
[Status@ Fault 1] stores the most recent fault, [Status@ Fault 2] stores the second most recent fault and [Status@ Fault 3] stores the third most recent fault.



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(1) Setting is specific to PowerFlex 525 drives only.

Values	Default:	Read Only
	Min/Max:	0/0x1F
	Display:	1

Fault and Diagnostic Group *(continued)*

F681 [Comm Sts - DSI]

Displays the status of the RS485 serial (DSI) port to the drive.

1 = Condition True, 0 = Condition False

Rx	Digit 1
Tx	Digit 2
Status	Digit 3
Error	Digit 4
Not Used	

Digit 3 (Connection Status)	
0	"Not Active"
1	"Modbus slave network (external Modbus master)"
2	"Modbus multi-drive w/ internal com option master"
3	"Modbus multi-drive w/ embedded com master"(1)
4	"DSI peripheral connected"
5…8	"Reserved"
9	"RS-485 network faulted"

(1) Setting is specific to PowerFlex 525 drives only.

Values		
	Default:	Read Only
	Min/Max:	0000/1911
	Display:	0000

F682 [Comm Sts - Opt]

Displays the status of the internal communication to the drive.

1 = Condition True, 0 = Condition False

Rx	Digit 1
Tx	Digit 2
Status	Digit 3
Error	Digit 4
Not Used	

Digit 3 = "Internal Com option"	
0	"Not Active (no connection)"
1	"Internal option connected/active"
2…8	"Reserved"
9	"Internal com option faulted"

Values		
	Default:	Read Only
	Min/Max:	0000/1911
	Display:	0000

F683 [Com Sts-Emb Enet]

PF 525 PowerFlex 525 only.

Displays the status of the embedded EtherNet/IP interface to the drive.

1 = Condition True, 0 = Condition False

Rx	Digit 1
Tx	Digit 2
Status	Digit 3
Error	Digit 4
Not Used	

Digit 3 = "Embedded EtherNet/IP"	
0	"Not Active (no connection)"
1	"Embedded EtherNet/IP active"
2-8	"Reserved"
9	"Embedded EtherNet/IP faulted"

Values		
	Default:	Read Only
	Min/Max:	0000/1911
	Display:	0000

F684 [EN Addr Src]

PF 525 PowerFlex 525 only.

Displays the actual source of the Ethernet configuration (IP address, subnet mask, and gateway address).

Options		
	1 "Parameters"	Read Only
	2 "BOOTP"	

Fault and Diagnostic Group *(continued)*

F685 [EN Rate Act]

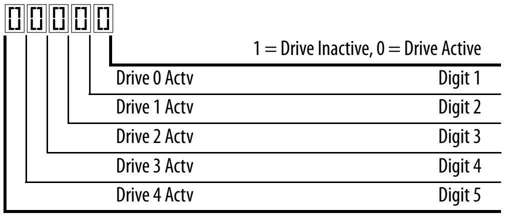
PF 525 PowerFlex 525 only.

Displays the network data rate currently used by the embedded EtherNet/IP interface.

Options	0	"No Link"	Read Only
	1	"10Mbps Full"	
	2	"10Mbps Half"	
	3	"100Mbps Full"	
	4	"100Mbps Half"	
	5	"Dup IP Addr"	
	6	"Disabled"	

F686 [DSI I/O Act]

Displays the Drives that are active in Multi-Drive mode.



1 = Drive Inactive, 0 = Drive Active

Drive 0 Actv	Digit 1
Drive 1 Actv	Digit 2
Drive 2 Actv	Digit 3
Drive 3 Actv	Digit 4
Drive 4 Actv	Digit 5

Value	Default:	Read Only
	Min/Max:	00000/11111
	Display:	00000

F687 [HW Addr 1]
F688 [HW Addr 2]
F689 [HW Addr 3]
F690 [HW Addr 4]
F691 [HW Addr 5]
F692 [HW Addr 6]

PF 525 PowerFlex 525 only.

Shows the MAC address for the embedded EtherNet/IP interface.

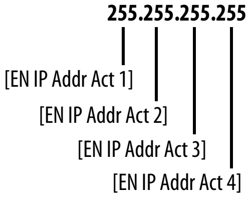
Values	Default:	Read Only
	Min/Max:	0/255
	Display:	1

Fault and Diagnostic Group *(continued)*

F693 [EN IP Addr Act 1]
F694 [EN IP Addr Act 2]
F695 [EN IP Addr Act 3]
F696 [EN IP Addr Act 4]

PF 525 PowerFlex 525 only.

Shows the actual IP address used by the embedded EtherNet/IP interface at the time. This indicates 0 if no address is set.

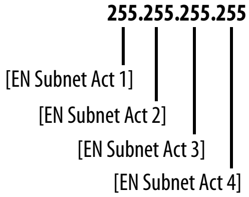

255.255.255.255
[EN IP Addr Act 1]
[EN IP Addr Act 2]
[EN IP Addr Act 3]
[EN IP Addr Act 4]

Values	Default:	Read Only
	Min/Max:	0/255
	Display:	1

F697 [EN Subnet Act 1]
F698 [EN Subnet Act 2]
F699 [EN Subnet Act 3]
F700 [EN Subnet Act 4]

PF 525 PowerFlex 525 only.

Shows the actual subnet mask used by the embedded EtherNet/IP interface at the time. This will indicate 0 if no address is set.

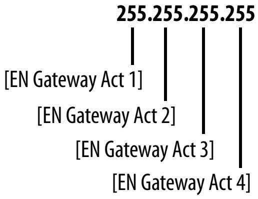

255.255.255.255
[EN Subnet Act 1]
[EN Subnet Act 2]
[EN Subnet Act 3]
[EN Subnet Act 4]

Values	Default:	Read Only
	Min/Max:	0/255
	Display:	1

F701 [EN Gateway Act 1]
F702 [EN Gateway Act 2]
F703 [EN Gateway Act 3]
F704 [EN Gateway Act 4]

PF 525 PowerFlex 525 only.

Shows the actual gateway address used by the embedded EtherNet/IP interface at the time. This will indicate 0 if no address is set.


255.255.255.255
[EN Gateway Act 1]
[EN Gateway Act 2]
[EN Gateway Act 3]
[EN Gateway Act 4]

Values	Default:	Read Only
	Min/Max:	0/255
	Display:	1

Fault and Diagnostic Group *(continued)*

F705 [Drv 0 Logic Cmd]
F709 [Drv 1 Logic Cmd]
F713 [Drv 2 Logic Cmd]
F717 [Drv 3 Logic Cmd]
F721 [Drv 4 Logic Cmd]

In multi-drive mode, this is the logic command being transmitted to drive 0/1/2/3/4/.

In single-drive mode, this is the logic command being used by the drive (whether HS-DSI, EtherNet/IP, or DSI) at the time. If comms control is NOT being used, and the drive is in single-drive mode, then this parameter will show 0.

Values	Default:	Read Only
	Min/Max:	0/FFFF
	Display:	1

F706 [Drv 0 Reference]
F710 [Drv 1 Reference]
F714 [Drv 2 Reference]
F718 [Drv 3 Reference]
F722 [**Drv 4 Reference]**

In multi-drive mode, this is the reference being transmitted to drive 0/1/2/3/4.

In single-drive mode, this is the reference being used by the drive (whether HS-DSI, EtherNet/IP, or DSI) at the time. If comms control is NOT being used, and the drive is in single-drive mode, then this parameter will show 0.

Values	Default:	Read Only
	Min/Max:	0.00/500.00 Hz
	Display:	0.01 Hz

F707 [Drv 0 Logic Sts]
F711 [Drv 1 Logic Sts]
F715 [Drv 2 Logic Sts]
F719 [Drv 3 Logic Sts]
F723 [Drv 4 Logic Sts]

In multi-drive mode, this is the logic status being received from drive 0/1/2/3/4.

In single-drive mode, this is the logic status of the drive at the time.

Values	Default:	Read Only
	Min/Max:	0/FFFF
	Display:	1

F708 [Drv 0 Feedback]
F712 [Drv 1 Feedback]
F716 [Drv 2 Feedback]
F720 [Drv 3 Feedback]
F724 [Drv 4 Feedback]

In multi-drive mode, this is the feedback being received from drive 0/1/2/3/4.

In single-drive mode, this is the feedback of the drive at the time.

Values	Default:	Read Only
	Min/Max:	0.00/500.00 Hz
	Display:	0.01 Hz

F725 [EN Rx Overruns]

PF 525 PowerFlex 525 only.

A count of the number of receive overrun errors reported by the embedded EtherNet/IP interface.

Values	Default:	Read Only
	Min/Max:	0/65535
	Display:	1

Fault and Diagnostic Group *(continued)*

F726 [EN Rx Packets]

PF 525 PowerFlex 525 only.

A count of the number of receive packets reported by the embedded EtherNet/IP interface.

Values	Default:	Read Only
	Min/Max:	0/65535
	Display:	1

F727 [EN Rx Errors]

PF 525 PowerFlex 525 only.

A count of the number of receive errors reported by the embedded EtherNet/IP interface.

Values	Default:	Read Only
	Min/Max:	0/65535
	Display:	1

F728 [EN Tx Packets]

PF 525 PowerFlex 525 only.

A count of the number of transmitted packets reported by the embedded EtherNet/IP interface.

Values	Default:	Read Only
	Min/Max:	0/65535
	Display:	1

F729 [EN Tx Errors]

PF 525 PowerFlex 525 only.

A count of the number of transmit errors reported by the embedded EtherNet/IP interface.

Values	Default:	Read Only
	Min/Max:	0/65535
	Display:	1

F730 [EN Missed IO Pkt]

PF 525 PowerFlex 525 only.

The number of I/O packets missed.

Values	Default:	Read Only
	Min/Max:	0/65535
	Display:	1

F731 [DSI Errors]

The number of total DSI errors.

Values	Default:	Read Only
	Min/Max:	0/65535
	Display:	1

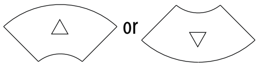
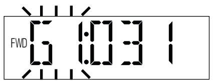
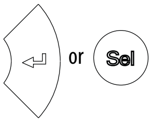
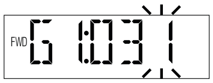
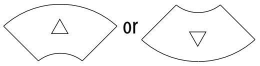
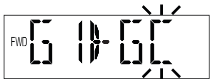
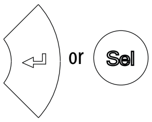
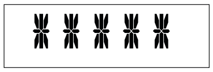
AppView Parameter Groups

PowerFlex 520-series drives include various AppView parameter groups that groups certain parameters together for quick and easy access based on different types of applications. These applications include:

- Conveyor
- Mixer
- Compressor
- Centrifugal Pump
- Blower/Fan
- Extruder
- Positioning (PowerFlex 525 only)
- Textile/Fiber

You cannot add or remove parameters to or from the AppView parameter groups. If you require quick access to additional parameters to what is already included in the different AppView parameter groups, use the CustomView parameter group instead.

The parameters in the AppView parameter groups can be quickly added to the CustomView parameter group by doing the following:

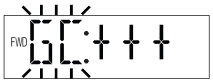
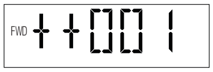
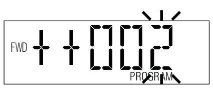
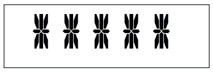
Step		Key(s)	Example Displays
1.	Press the Up Arrow or Down Arrow to scroll to an AppView group (G1...G8).		
2.	Press Enter or Sel to enter a group. The right most digit of the last viewed parameter in that group will flash.		
3.	Press the Up Arrow or Down Arrow to scroll to the command G1->GC.		
4.	Press Enter or Sel to add all the parameters in this AppView group to the CustomView group. The LCD display will show a confirmation.		

CustomView Parameter Group

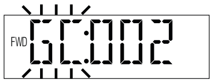
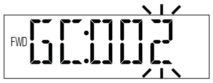
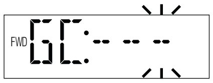
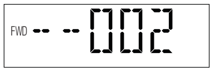
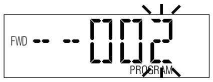
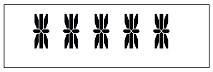
Use the CustomView parameter group to:

- store frequently used parameters for your application for quicker access.
- select only those parameters needed for your application and if required, hide all other parameters with A552 [Program Lock].

Up to 100 parameters can be stored in the CustomView parameter group. You can copy one entire AppView parameter group to the CustomView parameter group as shown above or add individual parameters as show below.

Step		Key(s)	Example Displays
1.	Press the Up Arrow or Down Arrow to scroll to the CustomView group (GC).	△ or ▽	
2.	Press Enter to view the parameters that can be added to the CustomView group.	⏎	
3.	Press the Up Arrow or Down Arrow to scroll through the list of parameters.	△ or ▽	
4.	Press Enter to add the parameter to the CustomView group. The LCD display will show a confirmation.	⏎	

To delete parameters from the CustomView parameter group:

Step		Key(s)	Example Displays
1.	Press the Up Arrow or Down Arrow to scroll to the CustomView group (GC).	△ or ▽	
2.	Press Enter to view the parameters that are in the CustomView group.	⏎	
3.	Press the Up Arrow or Down Arrow to scroll to the command GC---.	△ or ▽	
4.	Press Enter or Sel to view the parameters that are stored in the CustomView group.	⏎ or Sel	
5.	Press the Up Arrow or Down Arrow to scroll through the list of parameters.	△ or ▽	
6.	Press Enter to delete the parameter from the CustomView group. The LCD display will show a confirmation.	⏎	

TIP The Connected Components Workbench software can be used to speed up this process with drag and drop functionality.

Parameter Cross Reference by Name

Parameter Name	No.
10V Bipolar Enbl(1)	093
2-Wire Mode	064
Accel Time 1	041
Accel Time 2	442
Accel Time 3	444
Accel Time 4	446
Accum CO2 Sav	026
Accum Cost Sav	025
Accum kWh Sav	024
Analog In 0-10V	360
Analog In 4-20mA	361
Analog In Filter	099
Analog Out High(1)	089
Analog Out Sel(1)	088
Anlg In 0-10V Hi	092
Anlg In 0-10V Lo	091
Anlg In mA Loss	097
Anlg In V Loss	094
Anlg In4-20mA Hi	096
Anlg In4-20mA Lo	095
Anlg Loss Delay	098
Anlg Out Setpt(1)	090
Auto Rstrt Delay	542
Auto Rstrt Tries	541
Autotune	040
Average kWh Cost	052
Average Power	020
Boost Select	530
Break Frequency	533
Break Voltage	532
Bus Reg Enable	550
Cmd Stat Select(1)	122
Com Sts-Emb Enet(1)	683
Comm Loss Action	125
Comm Loss Time	126
Comm Sts - DSI	681
Comm Sts - Opt	682
Comm Write Mode	121
Commanded Freq	002
Compensation	547
Contrl In Status	013
Control Source	012
Control SW Ver	029
Control Temp	028
Counter Status	364
Counts Per Unit(1)	559
Current Limit 1	484
Current Limit 2(1)	485
DB Resistor Sel	437
DB Threshold	438
DC Brake Level	435
DC Brake Time	434
DC Brk Time@Strt	436
DC Bus Ripple	380
DC Bus Voltage	005
Decel Time 1	042
Decel Time 2	443
Decel Time 3	445
Decel Time 4	447
Dig In Status	014
DigIn TermBlk 02	062
DigIn TermBlk 03	063
DigIn TermBlk 05	065
DigIn TermBlk 06	066
DigIn TermBlk 07(1)	067
DigIn TermBlk 08(1)	068
Drive OL Mode	495
Drive Status	006
Drive Temp	027
Drive Type	367
Droop Hertz@ FLA(1)	441
Drv 0 Feedback	708
Drv 0 Logic Cmd	705
Drv 0 Logic Sts	707
Drv 0 Reference	706
Drv 1 Addr	171
Drv 1 Feedback	712
Drv 1 Logic Cmd	709
Drv 1 Logic Sts	711
Drv 1 Reference	710
Drv 2 Addr	172
Drv 2 Feedback	716
Drv 2 Logic Cmd	713
Drv 2 Logic Sts	715
Drv 2 Reference	714
Drv 3 Addr	173
Drv 3 Feedback	720
Drv 3 Logic Cmd	717
Drv 3 Logic Sts	719
Drv 3 Reference	718
Drv 4 Addr	174
Drv 4 Feedback	724
Drv 4 Logic Cmd	721
Drv 4 Logic Sts	723
Drv 4 Reference	722
Drv Ambient Sel	554
DSI Errors	731
DSI I/O Act	686
DSI I/O Cfg	175
Elapsed kWh	021
Elapsed MWh	022
Elapsed Run Time	019
Elapsed Time-hr	362
Elapsed Time-min	363
EM Brk Off Delay	086
EM Brk On Delay	087
EN Addr Sel(1)	128
EN Addr Src(1)	684
EN Comm Flt Actn(1)	143
EN Data In 1(1)	153
EN Data In 2(1)	154
EN Data In 3(1)	155
EN Data In 4(1)	156
EN Data Out 1(1)	157
EN Data Out 2(1)	158
EN Data Out 3(1)	159
EN Data Out 4(1)	160
EN Flt Cfg DL 1(1)	147
EN Flt Cfg DL 2(1)	148
EN Flt Cfg DL 3(1)	149
EN Flt Cfg DL 4(1)	150
EN Flt Cfg Logic(1)	145
EN Flt Cfg Ref(1)	146
EN Gateway Act 1(1)	701
EN Gateway Act 2(1)	702
EN Gateway Act 3(1)	703
EN Gateway Act 4(1)	704
EN Gateway Cfg 1(1)	137
EN Gateway Cfg 2(1)	138
EN Gateway Cfg 3(1)	139
EN Gateway Cfg 4(1)	140
EN Idle Flt Actn(1)	144
EN IP Addr Act 1(1)	693
EN IP Addr Act 2(1)	694
EN IP Addr Act 3(1)	695
EN IP Addr Act 4(1)	696
EN IP Addr Cfg 1(1)	129
EN IP Addr Cfg 2(1)	130
EN IP Addr Cfg 3(1)	131
EN IP Addr Cfg 4(1)	132
EN Missed IO Pkt(1)	730

(1) Parameter is specific to PowerFlex 525 drives only.

Parameter Name	**No.**
EN Rate Act(1)	685
EN Rate Cfg(1)	141
EN Rx Errors(1)	727
EN Rx Overrruns(1)	725
EN Rx Packets(1)	726
EN Subnet Act 1(1)	697
EN Subnet Act 2(1)	698
EN Subnet Act 3(1)	699
EN Subnet Act 4(1)	700
EN Subnet Cfg 1(1)	133
EN Subnet Cfg 2(1)	134
EN Subnet Cfg 3(1)	135
EN Subnet Cfg 4(1)	136
EN Tx Errors(1)	729
EN Tx Packets(1)	728
Encoder Pos Tol(1)	564
Encoder PPR(1)	536
Encoder Speed(1)	378
Energy Saved	023
Enh Control Word(1)	560
Fault 1 BusVolts	651
Fault 1 Code	007
Fault 1 Current	641
Fault 1 Freq	631
Fault 1 Time-hr	611
Fault 1 Time-min	621
Fault 2 BusVolts	652
Fault 2 Code	008
Fault 2 Current	642
Fault 2 Freq	632
Fault 2 Time-hr	612
Fault 2 Time-min	622
Fault 3 BusVolts	653
Fault 3 Code	009
Fault 3 Current	643
Fault 3 Freq	633
Fault 3 Time-hr	613
Fault 3 Time-min	623
Fault 4 BusVolts	654
Fault 4 Code	604
Fault 4 Current	644
Fault 4 Freq	634
Fault 4 Time-hr	614
Fault 4 Time-min	624
Fault 5 BusVolts	655
Fault 5 Code	605
Fault 5 Current	645
Fault 5 Freq	635
Fault 5 Time-hr	615
Fault 5 Time-min	625
Fault 6 BusVolts(1)	656
Fault 6 Code(1)	606
Fault 6 Current(1)	646
Fault 6 Freq(1)	636
Fault 6 Time-hr(1)	616
Fault 6 Time-min(1)	626
Fault 7 BusVolts(1)	657
Fault 7 Code(1)	607
Fault 7 Current(1)	647
Fault 7 Freq(1)	637
Fault 7 Time-hr(1)	617
Fault 7 Time-min(1)	627
Fault 8 BusVolts(1)	658
Fault 8 Code(1)	608
Fault 8 Current(1)	648
Fault 8 Freq(1)	638
Fault 8 Time-hr(1)	618
Fault 8 Time-min(1)	628
Fault 9 BusVolts(1)	659
Fault 9 Code(1)	609
Fault 9 Current(1)	649
Fault 9 Freq(1)	639
Fault 9 Time-hr(1)	619
Fault 9 Time-min(1)	629
Fault Clear	551
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(1) Parameter is specific to PowerFlex 525 drives only.

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Step Units 2(1)	204
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Step Units 4(1)	208
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(1) Parameter is specific to PowerFlex 525 drives only.

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(1) Parameter is specific to PowerFlex 525 drives only.

Notes:

Troubleshooting

This chapter provides information to guide you in troubleshooting the PowerFlex 520-series drive. Included is a listing and description of drive faults with possible solutions, when applicable.

For information on...	See page...
Drive Status	147
Faults	147
Fault Descriptions	149
Common Symptoms and Corrective Actions	152

⚠ **ATTENTION:** Risk of injury or equipment damage exists. Drive does not contain user-serviceable components. Do not disassemble drive chassis.

Drive Status

The condition or state of your drive is constantly monitored. Any changes will be indicated through the integral LCD display.

See Display and Control Keys on page 62 for information on drive status indicators and controls.

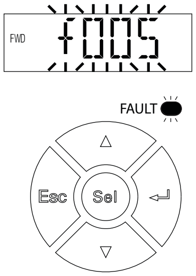
Faults

A fault is a condition that stops the drive. There are two fault types.

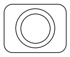
Fault Types

Type	Fault Description	
1	Auto-Reset/Run	When this type of fault occurs, and A541 [Auto Rstrt Tries] is set to a value greater than "0," a user-configurable timer, A542 [Auto Rstrt Delay], begins. When the timer reaches zero, the drive attempts to automatically reset the fault. If the condition that caused the fault is no longer present, the fault will be reset and the drive will be restarted.
2	Non-Resettable	This type of fault may require drive or motor repair, or is caused by wiring or programming errors. The cause of the fault must be corrected before the fault can be cleared.

Fault Indication

Condition	Display
Drive is indicating a fault. The integral LCD display provides visual notification of a fault condition by displaying the following. • Flashing fault number • Flashing fault indicator (LED) Press the Esc key to regain control of the display.	

Manually Clearing Faults

Step	Key(s)
1. Press Esc to acknowledge the fault. The fault information will be removed so that you can use the integral keypad. Access b007 [Fault 1 Code] to view the most recent fault information. 2. Address the condition that caused the fault. The cause must be corrected before the fault can be cleared. See Fault Types, Descriptions and Actions on page 149. 3. After corrective action has been taken, clear the fault by one of these methods. • Press Stop if P045 [Stop Mode] is set to a value between "0" and "3". • Cycle drive power. • Set A551 [Fault Clear] to 1 "Reset Fault" or 2 "Clear Buffer". • Cycle digital input if t062, t063, t065...t068 [DigIn TermBlk xx] is set to 13 "Clear Fault".	 

Automatically Clearing Faults

Option/Step	
Clear a Type 1 fault and restart the drive. 1. Set A541 [Auto Rstrt Tries] to a value other than "0". 2. Set A542 [Auto Rstrt Delay] to a value other than "0".	
Clear an OverVoltage, UnderVoltage or Heatsink OvrTmp fault without restarting the drive. 1. Set A541 [Auto Rstrt Tries] to a value other than "0". 2. Set A542 [Auto Rstrt Delay] to "0".	

ATTENTION: Equipment damage and/or personal injury may result if these parameters are used in an inappropriate application. Do not use this function without considering applicable local, national and international codes, standards, regulations or industry guidelines.

Auto Restart (Reset/Run)

The Auto Restart feature provides the ability for the drive to automatically perform a fault reset followed by a start attempt without user or application intervention. This allows remote or "unattended" operation. Only certain faults are allowed to be reset. Certain faults (Type 2) that indicate possible drive component malfunction are not resettable. Fault types are listed in the table Fault Types on page 147. See Fault Descriptions on page 149 for more information.

Use caution when enabling this feature, since the drive will attempt to issue its own start command based on user selected programming.

Fault Descriptions

Fault Types, Descriptions and Actions

No.	Fault	Type[2]	Description	Action
F000	No Fault	–	No fault present.	–
F002	Auxiliary Input	1	External trip (Auxiliary) input.	• Check remote wiring. • Verify communications programming for intentional fault.
F003	Power Loss	2	Single phase operation detected with excessive load.	• Monitor the incoming AC line for low voltage or line power interruption. • Check input fuses. • Reduce load.
F004	UnderVoltage	1	DC bus voltage fell below the minimum value.	Monitor the incoming AC line for low voltage or line power interruption.
F005	OverVoltage	1	DC bus voltage exceeded maximum value.	Monitor the AC line for high line voltage or transient conditions. Bus overvoltage can also be caused by motor regeneration. Extend the decel time or install dynamic brake option.
F006	Motor Stalled	1	Drive is unable to accelerate or decelerate motor.	• Increase P041, A442, A444, A446 [Accel Time x] or reduce load so drive output current does not exceed the current set by parameter A484, A485 [Current Limit x] for too long. • Check for overhauling load.
F007	Motor Overload	1	Internal electronic overload trip.	• An excessive motor load exists. Reduce load so drive output current does not exceed the current set by parameter P033 [Motor OL Current]. • Verify A530 [Boost Select] setting.
F008	Heatsink OvrTmp	1	Heatsink/Power Module temperature exceeds a predefined value.	• Check for blocked or dirty heat sink fins. Verify that ambient temperature has not exceeded the rated ambient temperature. • Check fan.
F009	CC OvrTmp	1	Control module temperature exceeds a predefined value.	• Check product ambient temperature. • Check for airflow obstruction. • Check for dirt or debris. • Check fan.
F012	HW OverCurrent	2	The drive output current has exceeded the hardware current limit.	Check programming. Check for excess load, improper A530 [Boost Select] setting, DC brake volts set too high or other causes of excess current.
F013	Ground Fault	2	A current path to earth ground has been detected at one or more of the drive output terminals.	Check the motor and external wiring to the drive output terminals for a grounded condition.

Fault Types, Descriptions and Actions

No.	Fault	Type[2]	Description	Action
F015[1]	Load Loss	2	The output torque current is below the value programmed in A490 [Load Loss Level] for a time period greater than the time programmed in A491 [Load Loss Time].	• Verify connections between motor and load. • Verify level and time requirements
F021	Output Ph Loss	1	Output Phase Loss (if enabled). Configure with A557 [Out Phas Loss En].	• Verify motor wiring. • Verify motor.
F029	Analog In Loss	1	An analog input is configured to fault on signal loss. A signal loss has occurred. Configure with t094 [Anlg In V Loss] or t097 [Anlg In mA Loss].	• Check for broken/loose connections at inputs. • Check parameters.
F033	Auto Rstrt Tries	2	Drive unsuccessfully attempted to reset a fault and resume running for the programmed number of A541 [Auto Rstrt Tries].	Correct the cause of the fault and manually clear.
F038	Phase U to Gnd	2	A phase to ground fault has been detected between the drive and motor in this phase.	• Check the wiring between the drive and motor. • Check motor for grounded phase. • Replace drive if fault cannot be cleared.
F039	Phase V to Gnd			
F040	Phase W to Gnd			
F041	Phase UV Short	2	Excessive current has been detected between these two output terminals.	• Check the motor and drive output terminal wiring for a shorted condition. • Replace drive if fault cannot be cleared.
F042	Phase UW Short			
F043	Phase VW Short			
F048	Params Defaulted	1	The drive was commanded to write default values to EEPROM.	• Clear the fault or cycle power to the drive. • Program the drive parameters as needed.
F059[1]	Safety Open	1	Both of the safety inputs (Safety 1, Safety 2) are not enabled. Configure with t105 [Safety Open En].	• Check safety input signals. If not using safety, verify and tighten jumper for I/O terminals S1, S2 and S+.
F063	SW OverCurrent	1	Programmed A486, A488 [Shear Pinx Level] has been exceeded for a time period greater than the time programmed in A487, A489 [Shear Pin x Time].	• Verify connections between motor and load. • Verify level and time requirements.
F064	Drive Overload	2	Drive overload rating has been exceeded.	Reduce load or extend Accel Time.
F070	Power Unit	2	Failure has been detected in the drive power section.	• Check maximum ambient temperature has not been exceeded. • Cycle power. • Replace drive if fault cannot be cleared.
F071	DSI Net Loss	2	Control over the Modbus or DSI communication link has been interrupted.	• Cycle power. • Check communications cabling. • Check Modbus or DSI setting. • Check Modbus or DSI status.
F072	Opt Net Loss	2	Control over the network option card's remote network has been interrupted.	• Cycle power. • Check communications cabling. • Check network adapter setting. • Check external network status.
F073[1]	EN Net Loss	2	Control through the embedded EtherNet/IP adapter has been interrupted.	• Cycle power. • Check communications cabling. • Check EtherNet/IP setting. • Check external network status.
F080	Autotune Failure	2	The autotune function was either cancelled by the user or failed.	Restart procedure.

Fault Types, Descriptions and Actions

No.	Fault	Type[2]	Description	Action
F081	DSI Comm Loss	2	Communications between the drive and the Modbus or DSI master device have been interrupted.	• Cycle power. • Check communications cabling. • Check Modbus or DSI setting. • Check Modbus or DSI status. • Modify using C125 [Comm Loss Action]. • Connecting I/O terminals C1 and C2 to ground may improve noise immunity. • Replace wiring, Modbus master device, or control module.
F082	Opt Comm Loss	2	Communications between the drive and the network option card have been interrupted.	• Cycle power. • Reinstall option card in drive. • Modify using C125 [Comm Loss Action]. • Replace wiring, port expander, option card, or control module.
F083[1]	EN Comm Loss	2	Internal communications between the drive and the embedded EtherNet/IP adapter have been interrupted.	• Cycle power. • Check EtherNet/IP setting. • Check drive's Ethernet settings and diagnostic parameters. • Modify using C125 [Comm Loss Action]. • Replace wiring, Ethernet switch, or control module.
F091[1]	Encoder Loss	2	Requires differential encoder. One of the 2 encoder channel signals is missing.	• Check Wiring. • If P047, P049, P051 [Speed Referencex] = 16 "Positioning" and A535 [Motor Fdbk Type] = 5 "Quad Check", swap the Encoder channel inputs or swap any two motor leads. • Replace encoder.
F094	Function Loss	2	"Freeze-Fire" (Function Loss) input is inactive, input to the programmed terminal is open.	Close input to the terminal and cycle power.
F100	Parameter Chksum	2	Drive parameter non-volatile storage is corrupted.	Set P053 [Reset To Defalts] to 2 "Factory Rset".
F101	External Storage	2	External non-volatile storage has failed.	Set P053 [Reset To Defalts] to 2 "Factory Rset".
F105	C Connect Err	2	Control module was disconnected while drive was powered.	Clear fault and verify all parameter settings. Do not remove or install the control module while power is applied.
F106	Incompat C-P	2	The control module could not recognize the power module.	• Cycle power. • Flash with newer firmware version. • Replace drive if fault cannot be cleared.
F107	Replaced C-P	2	The control module was mounted to a power module with a different power rating.	Set P053 [Reset To Defalts] to any of the reset options.
F109	Mismatch C-P	2	The control module was mounted to a different drive type power module.	Set P053 [Reset To Defalts] to any of the reset options.
F110	Keypad Membrane	2	Keypad membrane failure / disconnected.	• Cycle power. • Replace control module if fault cannot be cleared.
F111[1]	Safety Hardware	2	Safety input enable hardware malfunction. One of the safety inputs is not enabled.	• Check safety input signals. If not using safety, verify and tighten jumper for I/O terminals S1, S2 and S+. • Replace control module if fault cannot be cleared.
F114	uC Failure	2	Microprocessor failure.	• Cycle power. • Replace control module if fault cannot be cleared.

Fault Types, Descriptions and Actions

No.	Fault	Type[2]	Description	Action
F122	I/O Board Fail	2	Failure has been detected in the drive control and I/O section.	• Cycle power. • Replace drive or control module if fault cannot be cleared.
F125	Flash Update Req	2	The firmware in the drive is corrupt, mismatched, or incompatible with the hardware.	Perform a firmware flash update operation to attempt to load a valid set of firmware.
F126	NonRecoverablErr	2	A non-recoverable firmware or hardware error was detected. The drive was automatically stopped and reset.	• Clear fault or cycle power to the drive. • Replace drive or control module if fault cannot be cleared.
F127	DSIFlashUpdatReq	2	A critical problem with the firmware was detected and the drive is running using backup firmware that only supports DSI communications.	Perform a firmware flash update operation using DSI communications to attempt to load a valid set of firmware.

(1) This fault is not applicable to PowerFlex 523 drives.

(2) See Fault Types for more information.

Common Symptoms and Corrective Actions

The drive is designed to start from the keypad when shipped. For a basic test of drive operation:

1. Remove all user I/O wire.
2. Verify safety terminals (S1, S2 and S+) jumper is in place and tightened.
3. Verify wire jumper is in place between I/O terminals 01 and 11.
4. Verify that the three jumpers are in their proper default positions on the control board. See PowerFlex 525 Control I/O Wiring Block Diagram on page 42 for more information.
5. Reset default parameter values by setting P053 [Reset Defalts] to 2 “Factory Rset”.
6. If safe to do so for your application, press Start on drive keypad. Drive will run according to the speed potentiometer.

Motor does not Start.

Cause(s)	Indication	Corrective Action
No output voltage to the motor.	None	Check the power circuit. • Check the supply voltage. • Check all fuses and disconnects. Check the motor. • Verify that the motor is connected properly. Check the control input signals. • Verify that a Start signal is present. If 2-Wire control is used, verify that either the Run Forward or Run Reverse signal is active, but not both. • Verify that I/O Terminal 01 is active. • Verify that P046, P048, P050 [Start Source x] matches your configuration. • Verify that A544 [Reverse Disable] is not prohibiting movement. • Verify that safety inputs (Safety 1 and Safety 2) are active.
Improper boost setting at initial start-up.	None	Set A530 [Boost Select] to 2 "35.0, VT".
Drive is Faulted	Flashing red status light	Clear fault. • Press Stop if P045 [Stop Mode] is set to a value between "0" and "3". • Cycle drive power. • Set A551 [Fault Clear] to 1 "Reset Fault" or 2 "Clear Buffer". • Cycle digital input if t062, t063, t065...t068 [DigIn TermBlk xx] is set to 13 "Clear Fault".
Incorrect programming. • P046, P048, P050 [Start Source x] is set incorrectly.	None	Check setting for b012 [Control Source].
Incorrect input wiring. See page 45 for wiring examples. • 2 wire control requires Run Forward, Run Reverse or Jog input. • 3 wire control requires Start and Stop inputs • Stop input is always required.	None	• Wire inputs correctly and/or install jumper. • If the PowerFlex 525 Safe-Torque-Off function is used, verify that inputs are active. • If 2-wire or 3-wire mode is used, verify that t062 [DigIn TermBlk 02] and t063 [DigIn TermBlk 03] are set properly.
Incorrect Sink/Source jumper setting.	None	Set switch to match wiring scheme.

Drive does not Start from Start or Run Inputs wired to the terminal block.

Cause(s)	Indication	Corrective Action
Drive is Faulted	Flashing red status light	Clear fault. • Press Stop if P045 [Stop Mode] is set to a value between "0" and "3". • Cycle drive power. • Set A551 [Fault Clear] to 1 "Reset Fault" or 2 "Clear Buffer". • Cycle digital input if t062, t063, t065...t068 [DigIn TermBlk xx] is set to 13 "Clear Fault".
Incorrect programming. • P046, P048, P050 [Start Source x] is set incorrectly. • t062, t063 [DigIn TermBlk 02/03] is set incorrectly.	None	Check parameter settings.
Incorrect input wiring. See page 45 for wiring examples. • 2 wire control requires Run Forward, Run Reverse or Jog input. • 3 wire control requires Start and Stop inputs • Stop input is always required.	None	• Wire inputs correctly and/or install jumper. • If the PowerFlex 525 Safe-Torque-Off function is used, verify that inputs are active.
Incorrect Sink/Source jumper setting.	None	Set switch to match wiring scheme.

Drive does not respond to changes in speed command.

Cause(s)	Indication	Corrective Action
No value is coming from the source of the command.	The drive "Run" indicator is lit and output is 0 Hz.	• Check b012 [Control Source] for correct source. • If the source is an analog input, check wiring and use a meter to check for presence of signal. • Check b002 [Commanded Freq] to verify correct command.
Incorrect reference source is being selected by remote device or digital inputs.	None	• Check b012 [Control Source] for correct source. • Check b014 [Dig In Status] to see if inputs are selecting an alternate source. Verify settings for t062, t063, t065-t068 [DigIn TermBlk xx]. • Check P047, P049, P051 [Speed Referencex] for the source of the speed reference. Reprogram as necessary. • Review the Speed Reference Control chart on page 49. • Verify communications if used.

Motor and/or drive will not accelerate to commanded speed.

Cause(s)	Indication	Corrective Action
Acceleration time is excessive.	None	Reprogram P041, A442, A444, A446 [Accel Time x].
Excess load or short acceleration times force the drive into current limit, slowing or stopping acceleration.	None	• Compare b003 [Output Current] with A484, A485 [Current Limit x]. • Remove excess load or reprogram P041, A442, A444, A446 [Accel Time x]. • Check for improper A530 [Boost Select] setting.
Speed command source or value is not as expected.	None	• Verify b002 [Commanded Freq]. • Check b012 [Control Source] for the proper Speed Command.
Programming is preventing the drive output from exceeding limiting values.	None	• Check P044 [Maximum Freq] to ensure that speed is not limited by programming. • Verify programming of A572 [Speed Ratio].
Torque performance does not match motor characteristics.	None	• Set motor nameplate full load amps in parameter P034 [Motor NP FLA]. • Perform P040 [Autotune] "Static Tune" or "Rotate Tune" procedure. • Set P039 [Torque Perf Mode] to 0 "V/Hz".

Motor operation is unstable.

Cause(s)	Indication	Corrective Action
Motor data was incorrectly entered.	None	1. Correctly enter motor nameplate data into P031, P032 and P033. 2. Enable A547 [Compensation]. 3. Use A530 [Boost Select] to reduce boost level.

Drive will not reverse motor direction.

Cause(s)	Indication	Corrective Action
Reverse is disabled.	None	Check A544 [Reverse Disable].
Digital input is not selected for reversing control.	None	Check [DigIn TermBlk xx] (See page 85). Choose correct input and program for reversing mode.
Digital input is incorrectly wired.	None	Check input wiring (See page 45).
Motor wiring is improperly phased for reverse.	None	Switch two motor leads.

Drive does not power up.

Cause(s)	Indication	Corrective Action
No input power to drive.	None	• Check the power circuit. • Check the supply voltage. • Check all fuses and disconnects.
Control module is not connected properly to power module.	None	1. Remove power. 2. Verify that the control module is properly and fully installed on the power module. 3. Reapply power.

Motor is rotating at zero Hz or slip frequency is not correct.

Cause(s)	Indication	Corrective Action
Incorrect speed calculation.	Improper speed.	• Verify P032 [Motor NP Hertz]. • Reduce boost with A530 [Boost Select]. • Set P036 [Motor NP RPM] to motor synchronous speed.

Notes:

Appendix A

Supplemental Drive Information

For information on...	See page...
Certifications	157
Environmental Specifications	158
Technical Specifications	159

Certifications

Certifications	PowerFlex 523	PowerFlex 525
c-UL-us	Listed to UL508C and CAN/CSA-C22.2 No. 14-05.	
C-Tick N223	Australian Communications and Media Authority In conformity with the following: Radiocommunications Act: 1992 Radiocommunications Standard: 2008 Radiocommunications Labelling Notice: 2008 Standards applied: EN 61800-3:2004	
CE	In conformity with the following European Directives: EMC Directive (2004/108/EC) Low Voltage Directive (2006/95/EC) Standards applied: EN 61800-3:2004 EN 61800-5-1:2007	
TUV	Not applicable	TÜV Rheinland Standards applied: EN ISO 13849-1:2008 EN 61800-5-2:2007 EN 61508 PARTS 1-7:2010 EN 62061:2005 EN 60204-1:2009 Certified to ISO 13849-1 SIL2/PLd with embedded Safe-Torque-Off function Meets Functional Safety (FS) when used with embedded Safe-Torque-Off function
ATEX **II (2) G D**	Not applicable	Certified to ATEX directive 94/9/EC Group II Category (2) GD Applications with ATEX Approved Motors
KCC	Korean Registration of Broadcasting and Communications Equipment Compliant with the following standards: Article 58-2 of Radio Waves Act, Clause 3	
GOST-R	Russian GOST-R Certificate no. POCC US.ME92.H00040	
AC 156	Tested by Trentec to be compliant with AC156 Acceptance Criteria for Seismic Qualification Testing of Nonstructural Components and 2003 International Building Code for worst-case seismic level for USA excluding site class F	

Certifications	PowerFlex 523	PowerFlex 525
EPRI	Electric Power Research Institute Certified compliant with the following standards: SEMI F47 IEC 61000-4-34	
Lloyds Register	Not applicable	Lloyd’s Register Type Approval Certificate 12/10068(E1)
RoHS	Compliant with the European “Restriction of Hazardous Substances” Directive	

The drive is also designed to meet the appropriate portions of the following specifications:

NFPA 70 - US National Electrical Code

NEMA ICS 7.1 - Safety standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.

Environmental Specifications

Specifications	PowerFlex 523	PowerFlex 525
Altitude:	See Current Derating Curves on page 17 for derating guidelines.	
Without derating:	1000 m (3300 ft) max.	
With derating:	Up to 4000 m (13,200 ft) max., with the exception of 600V drives at 2000 m (6600 ft) max.	
Max. Surrounding Air Temperature	See Current Derating Curves on page 17 for derating guidelines.	
Without derating:	-20…50 °C (-4…122 °F)	
With derating:	-20…60 °C (-4…140 °F) or -20…70 °C (-4…158 °F) with optional Control Module Fan kit.	
Storage Temperature:		
Frame A…D:	-40…85 °C (-40…185 °F)	
Frame E:	-40…70 °C (-40…158 °F) – Not applicable to PowerFlex 523 drives	
Atmosphere:		

IMPORTANT Drive **must not** be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the drive is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.

Relative Humidity:	0…95% noncondensing
Shock:	Complies with IEC 60068-2-27
Vibration:	Complies with IEC 60068-2-6:1995

	Operating and Nonoperating		Nonoperating (Transportation)	
Frame Size	**Force (Shock/Vibration)**	**Mounting Type**	**Force (Shock/Vibration)**	**Mounting Type**
A	15 g / 2 g	DIN rail or screw	30 g/ 2.5 g	Screw only
B	15 g / 2 g	DIN rail or screw	30 g/ 2.5 g	Screw only
C	15 g / 2 g	DIN rail or screw	30 g/ 2.5 g	Screw only
D	15 g / 2 g	Screw only	30 g/ 2.5 g	Screw only
E	15 g / 1.5 g	Screw only	30 g/ 2.5 g	Screw only

Conformal Coating:	Complies with: IEC 60721-3-3 to level 3C2 (chemical and gases only)
Surrounding Environment Pollution Degree	See Pollution Degree Ratings According to EN 61800-5-1 on page 52 for descriptions.
Pollution Degree 1 & 2:	All enclosures acceptable.
Sound Pressure Level (A-weighted)	Measurements are taken 1 m from the drive.
Frame A & B:	Maximum 53 dBA
Frame C:	Maximum 57 dBA
Frame D:	Maximum 64 dBA
Frame E:	Maximum 68 dBA – Not applicable to PowerFlex 523 drives

Technical Specifications

Protection

Specifications	PowerFlex 523	PowerFlex 525
Bus Overvoltage Trip		
100…120V AC Input:	405V DC bus (equivalent to 150V AC incoming line)	
200…240V AC Input:	405V DC bus (equivalent to 290V AC incoming line)	
380…480V AC Input:	810V DC bus (equivalent to 575V AC incoming line)	
525…600V AC Input:	1005V DC bus (equivalent to 711V AC incoming line)	
Bus Undervoltage Trip		
100…120V AC Input:	190V DC bus (equivalent to 75V AC incoming line)	
200…240V AC Input:	190V DC bus (equivalent to 150V AC incoming line)	
380…480V AC Input:	390V DC bus (equivalent to 275V AC incoming line)	
525…600V AC Input		
P038 = 3 "600V":	487V DC bus (equivalent to 344V AC incoming line)	
P038 = 2 "480V":	390V DC bus (equivalent to 275V AC incoming line)	
Power Ride-Thru:	100 ms	
Logic Control Ride-Thru:	0.5 s minimum, 2 s typical	
Electronic Motor Overload Protection:	Provides class 10 motor overload protection according to NEC article 430 and motor over-temperature protection according to NEC article 430.126 (A) (2). UL 508C File 29572.	
Overcurrent:	200% hardware limit, 300% instantaneous fault	
Ground Fault Trip:	Phase-to-ground on drive output	
Short Circuit Trip:	Phase-to-phase on drive output	

Electrical

Specifications	PowerFlex 523	PowerFlex 525
Voltage Tolerance:	-15% / +10%	
Frequency Tolerance:	47…63 Hz	
Input Phases:	Three-phase input provides full rating. Single-phase input provides 35% rating on three-phase drives.	
Displacement Power Factor:	0.98 across entire speed range	
Maximum Short Circuit Rating:	100,000 Amps Symmetrical	
Actual Short Circuit Rating:	Determined by AIC Rating of installed fuse/circuit breaker	
Transistor Type:	Isolated Gate Bipolar Transistor (IGBT)	
Internal DC Bus Choke	Only for Frame E drive ratings	
200…240V AC Input:	11 kW (15 HP)	
380…480V AC Input:	15…18.5 kW (20…25 HP)	
525…600V AC Input:	15…18.5 kW (20…25 HP)	

Control

Specifications	PowerFlex 523	PowerFlex 525
Method	Sinusoidal PWM, Volts/Hertz, Sensorless Vector Control, Economizer SVC motor control and Closed Loop Velocity Vector Control (Closed Loop Velocity Vector Control is not applicable to PowerFlex 523 drives)	
Carrier Frequency	2…16 kHz, Drive rating based on 4 kHz	
Frequency Accuracy		
Digital Input:	Within ±0.05% of set output frequency	
Analog Input:	Within 0.5% of maximum output frequency, 10-Bit resolution	
Analog Output:	–	±2% of full scale, 10-Bit resolution
Performance		
V/Hz (Volts per Hertz):	±1% of base speed across a 60:1 speed range	
SVC (Sensorless Vector):	±0.5% of base speed across a 100:1 speed range	
SVC Economizer:	±0.5% of base speed across a 100:1 speed range	
VVC (Velocity Vector Control):	±0.5% of base speed across a 60:1 speed range – Not applicable to PowerFlex 523 drives	

Specifications	PowerFlex 523	PowerFlex 525
Performance with Encoder	–	
SVC (Sensorless Vector):		±0.1% of base speed across a 100:1 speed range
SVC Economizer:		±0.1% of base speed across a 100:1 speed range
VVC (Velocity Vector Control):		±0.1% of base speed across a 1000:1 speed range
Output Voltage Range:	0V to rated motor voltage	
Output Frequency Range:	0…500 Hz (programmable)	
Efficiency:	97.5% (typical)	
Stop Modes:	Multiple programmable stop modes including – Ramp, Coast, DC-Brake, and Ramp-to-Stop	
Accel/Decel:	Four independently programmable accel and decel times. Each time may be programmed from 0…600 s in 0.01 s increments.	
Intermittent Overload		
Normal Duty:	–	110% Overload capability for up to 60 s, 150% for up to 3 s Applies for power rating above 15 kW (20 HP) only. Based on 480V drive rating.
Heavy Duty:	150% Overload capability for up to 60 s, 180% for up to 3 s (200% programmable)	

Control Inputs

Specifications		PowerFlex 523	PowerFlex 525
Digital	Bandwidth:	10 Rad/s for open and closed loop	
	Quantity:	(1) Dedicated for stop (4) Programmable	(1) Dedicated for stop (6) Programmable
	Current:	6 mA	
	Type		
	Source Mode (SRC):	18…24V = ON, 0…6V = OFF	
	Sink Mode (SNK):	0…6V = ON, 18…24V = OFF	
Analog:	Quantity:	(2) Isolated, -10-10V and 4-20mA	
	Specification		
	Resolution:	10-bit	
	0-10V DC Analog:	100k ohm input impedance	
	4-20mA Analog:	250 ohm input impedance	
	External Pot:	1…10k ohm, 2 W minimum	

Control Outputs

Specifications		PowerFlex 523	PowerFlex 525
Relay:	Quantity:	(1) Programmable Form C	(2) 1 Programmable Form A and 1 Programmable Form B
	Specification		
	Resistive Rating:	3.0 A @ 30V DC, 3.0 A @ 125V, 3.0 A @ 240V AC	
	Inductive Rating:	0.5 A @ 30V DC, 0.5 A @ 125V, 0.5 A @ 240V AC	
Opto:	Quantity:	–	(2) Programmable
	Specification:		30V DC, 50 mA Non-inductive
Analog	Quantity:	–	(1) Non-Isolated 0-10V or 4-20 mA
	Specification		
	Resolution:		10-bit
	0-10V DC Analog:		1 k ohm minimum
	4-20 mA Analog:		525 ohm maximum

Encoder

Specifications	PowerFlex 523	PowerFlex 525
Type:	–	Incremental, dual channel
Supply:		12V, 250 mA
Quadrature:		90 °, ±27 ° @ 25 °C
Duty Cycle:		50%, +10%
Requirements:		Encoders must be line driver type, quadrature (dual channel) or pulse (single channel), 3.5…26V DC output, single-ended or differential and capable of supplying a minimum of 10 mA per channel. Allowable input is DC up to a maximum frequency of 250 kHz. The encoder I/O automatically scales to allow 5V, 12V and 24V DC nominal voltages.

Watts Loss

PowerFlex 520-Series Estimated Watts Loss (Rated Load, Speed & PWM)

Voltage	Output Current (A)	Total Watts Loss
100…120V, 50/60 Hz 1-Phase	1.6	20.0
	2.5	27.0
	4.8	53.0
	6.0	67.0
200…240V, 50/60 Hz 1-Phase	1.6	20.0
	2.5	29.0
	4.8	50.0
	8.0	81.0
	11.0	111.0
200…240V, 50/60 Hz 1-Phase w/ EMC Filter	1.6	20.0
	2.5	29.0
	4.8	53.0
	8.0	84.0
	11.0	116.0
200…240V, 50/60 Hz 3-Phase	1.6	20.0
	2.5	29.0
	5.0	50.0
	8.0	79.0
	11.0	107.0
	17.5	148.0
	24.0	259.0
	32.2	323.0
	48.3	584.0
	62.1	708.0
380…480V, 50/60 Hz 3-Phase	1.4	27.0
	2.3	37.0
	4.0	62.0
	6.0	86.0
	10.5	129.0
	13.0	170.0
	17.0	221.0
	24.0	303.0
	30.0	387.0

PowerFlex 520-Series Estimated Watts Loss (Rated Load, Speed & PWM)

Voltage	Output Current (A)	Total Watts Loss
380…480V, 50/60 Hz 3-Phase w/ EMC Filter	1.4	27.0
	2.3	37.0
	4.0	63.0
	6.0	88.0
	10.5	133.0
	13.0	175.0
	17.0	230.0
	24.0	313.0
	30.0	402.0
	37.0	602.0
	43.0	697.0
525…600V, 50/60 Hz 3-Phase	0.9	22.0
	1.7	32.0
	3.0	50.0
	4.2	65.0
	6.6	95.0
	9.9	138.0
	12.0	164.0
	19.0	290.0
	22.0	336.0
	27.0	466.0
	32.0	562.0

Accessories and Dimensions

Product Selection

Catalog Number Description

25B	-	V	2P5	N	1	0	4
Drive		Voltage Rating	Rating	Enclosure	HIM	Emission Class	Version

PowerFlex 523 Drive Ratings

Catalog No.	Output Ratings			Input Voltage Range	Frame Size
	Heavy Duty		Output Current (A)		
	HP	kW			
100...120V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output					
25A-V1P6N104	0.25	0.2	1.6	85...132	A
25A-V2P5N104	0.5	0.4	2.5	85...132	A
25A-V4P8N104	1.0	0.75	4.8	85...132	B
25A-V6P0N104	1.5	1.1	6.0	85...132	B
200...240V AC (-15%, +10%) – 1-Phase Input, 0...230V 3-Phase Output					
25A-A1P6N104	0.25	0.2	1.6	170...264	A
25A-A2P5N104	0.5	0.4	2.5	170...264	A
25A-A4P8N104	1.0	0.75	4.8	170...264	A
25A-A8P0N104	2.0	1.5	8.0	170...264	B
25A-A011N104	3.0	2.2	11.0	170...264	B
200...240V AC (-15%, +10%) – 1-Phase Input with EMC Filter, 0...230V 3-Phase Output					
25A-A1P6N114	0.25	0.2	1.6	170...264	A
25A-A2P5N114	0.5	0.4	2.5	170...264	A
25A-A4P8N114	1.0	0.75	4.8	170...264	A
25A-A8P0N114	2.0	1.5	8.0	170...264	B
25A-A011N114	3.0	2.2	11.0	170...264	B
200...240V AC (-15%, +10%) – 3-Phase Input, 0...230V 3-Phase Output					
25A-B1P6N104	0.25	0.2	1.6	170...264	A
25A-B2P5N104	0.5	0.4	2.5	170...264	A
25A-B5P0N104	1.0	0.75	5.0	170...264	A
25A-B8P0N104	2.0	1.5	8.0	170...264	A
25A-B011N104	3.0	2.2	11.0	170...264	A
25A-B017N104	5.0	4.0	17.5	170...264	B
25A-B024N104	7.5	5.5	24.0	170...264	C
25A-B032N104	10.0	7.5	32.2	170...264	D
380...480V AC (-15%, +10%) – 3-Phase Input, 0...460V 3-Phase Output					
25A-D1P4N104	0.5	0.4	1.4	323...528	A
25A-D2P3N104	1.0	0.75	2.3	323...528	A
25A-D4P0N104	2.0	1.5	4.0	323...528	A
25A-D6P0N104	3.0	2.2	6.0	323...528	A
25A-D010N104	5.0	4.0	10.5	323...528	B
25A-D013N104	7.5	5.5	13.0	323...528	C
25A-D017N104	10.0	7.5	17.0	323...528	C

PowerFlex 523 Drive Ratings

Catalog No.	Output Ratings			Input Voltage Range	Frame Size
	Heavy Duty		Output Current (A)		
	HP	kW			
25A-D024N104	15.0	11.0	24.0	323…528	D
380…480V AC (-15%, +10%) – 3-Phase Input with EMC Filter, 0…460V 3-Phase Output					
25A-D1P4N114	0.5	0.4	1.4	323…528	A
25A-D2P3N114	1.0	0.75	2.3	323…528	A
25A-D4P0N114	2.0	1.5	4.0	323…528	A
25A-D6P0N114	3.0	2.2	6.0	323…528	A
25A-D010N114	5.0	4.0	10.5	323…528	B
25A-D013N114	7.5	5.5	13.0	323…528	C
25A-D017N114	10.0	7.5	17.0	323…528	C
25A-D024N114	15.0	11.0	24.0	323…528	D
525…600V AC (-15%, +10%) – 3-Phase Input, 0…575V 3-Phase Output					
25A-E0P9N104	0.5	0.4	0.9	446…660	A
25A-E1P7N104	1.0	0.75	1.7	446…660	A
25A-E3P0N104	2.0	1.5	3.0	446…660	A
25A-E4P2N104	3.0	2.2	4.2	446…660	A
25A-E6P6N104	5.0	4.0	6.6	446…660	B
25A-E9P9N104	7.5	5.5	9.9	446…660	C
25A-E012N104	10.0	7.5	12.0	446…660	C
25A-E019N104	15.0	11.0	19.0	446…660	D

PowerFlex 525 Drive Ratings

Catalog No.	Output Ratings					Input Voltage Range	Frame Size
	Normal Duty		Heavy Duty		Output Current (A)		
	HP	kW	HP	kW			
100…120V AC (-15%, +10%) – 1-Phase Input, 0…230V 3-Phase Output							
25B-V2P5N104	0.5	0.4	0.5	0.4	2.5	85…132	A
25B-V4P8N104	1.0	0.75	1.0	0.75	4.8	85…132	B
25B-V6P0N104	1.5	1.1	1.5	1.1	6.0	85…132	B
200…240V AC (-15%, +10%) – 1-Phase Input, 0…230V 3-Phase Output							
25B-A2P5N104	0.5	0.4	0.5	0.4	2.5	170…264	A
25B-A4P8N104	1.0	0.75	1.0	0.75	4.8	170…264	A
25B-A8P0N104	2.0	1.5	2.0	1.5	8.0	170…264	B
25B-A011N104	3.0	2.2	3.0	2.2	11.0	170…264	B
200…240V AC (-15%, +10%) – 1-Phase Input with EMC Filter, 0…230V 3-Phase Output							
25B-A2P5N114	0.5	0.4	0.5	0.4	2.5	170…264	A
25B-A4P8N114	1.0	0.75	1.0	0.75	4.8	170…264	A
25B-A8P0N114	2.0	1.5	2.0	1.5	8.0	170…264	B
25B-A011N114	3.0	2.2	3.0	2.2	11.0	170…264	B
200…240V AC (-15%, +10%) – 3-Phase Input, 0…230V 3-Phase Output							
25B-B2P5N104	0.5	0.4	0.5	0.4	2.5	170…264	A
25B-B5P0N104	1.0	0.75	1.0	0.75	5.0	170…264	A
25B-B8P0N104	2.0	1.5	2.0	1.5	8.0	170…264	A
25B-B011N104	3.0	2.2	3.0	2.2	11.0	170…264	A
25B-B017N104	5.0	4.0	5.0	4.0	17.5	170…264	B
25B-B024N104	7.5	5.5	7.5	5.5	24.0	170…264	C
25B-B032N104	10.0	7.5	10.0	7.5	32.2	170…264	D

PowerFlex 525 Drive Ratings

Catalog No.	Output Ratings					Input Voltage Range	Frame Size
	Normal Duty		Heavy Duty		Output Current (A)		
	HP	kW	HP	kW			
25B-B048N104	15.0	11.0	15.0	11.0	48.3	170…264	E
25B-B062N104	20.0	15.0	15.0	11.0	62.1	170…264	E
380…480V AC (-15%, +10%) – 3-Phase Input, 0…460V 3-Phase Output[1]							
25B-D1P4N104	0.5	0.4	0.5	0.4	1.4	323…528	A
25B-D2P3N104	1.0	0.75	1.0	0.75	2.3	323…528	A
25B-D4P0N104	2.0	1.5	2.0	1.5	4.0	323…528	A
25B-D6P0N104	3.0	2.2	3.0	2.2	6.0	323…528	A
25B-D010N104	5.0	4.0	5.0	4.0	10.5	323…528	B
25B-D013N104	7.5	5.5	7.5	5.5	13.0	323…528	C
25B-D017N104	10.0	7.5	10.0	7.5	17.0	323…528	C
25B-D024N104	15.0	11.0	15.0	11.0	24.0	323…528	D
25B-D030N104	20.0	15.0	15.0	11.0	30.0	323…528	D
380…480V AC (-15%, +10%) – 3-Phase Input with EMC Filter, 0…460V 3-Phase Output							
25B-D1P4N114	0.5	0.4	0.5	0.4	1.4	323…528	A
25B-D2P3N114	1.0	0.75	1.0	0.75	2.3	323…528	A
25B-D4P0N114	2.0	1.5	2.0	1.5	4.0	323…528	A
25B-D6P0N114	3.0	2.2	3.0	2.2	6.0	323…528	A
25B-D010N114	5.0	4.0	5.0	4.0	10.5	323…528	B
25B-D013N114	7.5	5.5	7.5	5.5	13.0	323…528	C
25B-D017N114	10.0	7.5	10.0	7.5	17.0	323…528	C
25B-D024N114	15.0	11.0	15.0	11.0	24.0	323…528	D
25B-D030N114	20.0	15.0	15.0	11.0	30.0	323…528	D
25B-D037N114	25.0	18.5	20.0	15.0	37.0	323…528	E
25B-D043N114	30.0	22.0	25.0	18.5	43.0	323…528	E
525…600V AC (-15%, +10%) – 3-Phase Input, 0…575V 3-Phase Output							
25B-E0P9N104	0.5	0.4	0.5	0.4	0.9	446…660	A
25B-E1P7N104	1.0	0.75	1.0	0.75	1.7	446…660	A
25B-E3P0N104	2.0	1.5	2.0	1.5	3.0	446…660	A
25B-E4P2N104	3.0	2.2	3.0	2.2	4.2	446…660	A
25B-E6P6N104	5.0	4.0	5.0	4.0	6.6	446…660	B
25B-E9P9N104	7.5	5.5	7.5	5.5	9.9	446…660	C
25B-E012N104	10.0	7.5	10.0	7.5	12.0	446…660	C
25B-E019N104	15.0	11.0	15.0	11.0	19.0	446…660	D
25B-E022N104	20.0	15.0	15.0	11.0	22.0	446…660	D
25B-E027N104	25.0	18.5	20.0	15.0	27.0	446…660	E
25B-E032N104	30.0	22.0	25.0	18.5	32.0	446…660	E

(1) A non-filtered drive is not available for 380...480V AC 25 HP (18.5 kW) and 30 HP (22.0 kW) ratings. Filtered drives are available, however you must verify that the application will support a filtered drive.

Dynamic Brake Resistors

Drive Ratings			**Minimum Resistance $\Omega \pm 10\%$**	**Resistance $\Omega \pm 5\%$**	**Catalog No.**(1)(2)
Input Voltage	**HP**	**kW**			
100...120V 50/60 Hz 1-Phase	0.25	0.2	56	91	AK-R2-091P500
	0.5	0.4	56	91	AK-R2-091P500
	1.0	0.75	56	91	AK-R2-091P500
	1.5	1.1	41	91	AK-R2-091P500
200...240V 50/60 Hz 1-Phase	0.25	0.2	56	91	AK-R2-091P500
	0.5	0.4	56	91	AK-R2-091P500
	1.0	0.75	56	91	AK-R2-091P500
	2.0	1.5	41	91	AK-R2-091P500
	3.0	2.2	32	47	AK-R2-047P500
200...240V 50/60 Hz 3-Phase	0.25	0.2	56	91	AK-R2-091P500
	0.5	0.4	56	91	AK-R2-091P500
	1.0	0.75	56	91	AK-R2-091P500
	2.0	1.5	41	91	AK-R2-091P500
	3.0	2.2	32	47	AK-R2-047P500
	5.0	4.0	18	47	AK-R2-047P500
	7.5	5.5	16	30	AK-R2-030P1K2
	10.0	7.5	14	30	AK-R2-030P1K2
	15.0	11.0	14	15	AK-R2-030P1K2(3)
	20.0	15.0	10	15	AK-R2-030P1K2(3)
380...480V 50/60 Hz 3-Phase	0.5	0.4	89	360	AK-R2-360P500
	1.0	0.75	89	360	AK-R2-360P500
	2.0	1.5	89	360	AK-R2-360P500
	3.0	2.2	89	120	AK-R2-120P1K2
	5.0	4.0	47	120	AK-R2-120P1K2
	7.5	5.5	47	120	AK-R2-120P1K2
	10.0	7.5	47	120	AK-R2-120P1K2
	15.0	11.0	43	60	AK-R2-120P1K2(3)
	20.0	15.0	43	60	AK-R2-120P1K2(3)
	25.0	18.5	27	40	AK-R2-120P1K2(4)
	30.0	22.0	27	40	AK-R2-120P1K2(4)
525...600V 50/60 Hz 3-Phase	0.5	0.4	112	360	AK-R2-360P500
	1.0	0.75	112	360	AK-R2-360P500
	2.0	1.5	112	360	AK-R2-360P500
	3.0	2.2	112	120	AK-R2-120P1K2
	5.0	4.0	86	120	AK-R2-120P1K2
	7.5	5.5	59	120	AK-R2-120P1K2
	10.0	7.5	59	120	AK-R2-120P1K2
	15.0	11.0	59	60	AK-R2-120P1K2(3)
	20.0	15.0	59	60	AK-R2-120P1K2(3)
	25.0	18.5	53	60	AK-R2-120P1K2(3)
	30.0	22.0	34	40	AK-R2-120P1K2(4)

(1) The resistors listed in this tables are rated for 5% duty cycle.

(2) Use of Rockwell Automation resistors is always recommended. The resistors listed have been carefully selected for optimizing performance in a variety of applications. Alternative resistors may be used, however, care must be taken when making a selection. See the PowerFlex Dynamic Braking Resistor Calculator, publication PFLEX-AT001.

(3) Requires two resistors wired in parallel.

(4) Requires three resistors wired in parallel.

EMC Line Filters

Drive Ratings					
Input Voltage	**HP**	**kW**	**Current (A)**	**Frame Size**	**Catalog No.**
100…120V 50/60 Hz 1-Phase	0.25	0.2	1.6	A	25-RF011-AL
	0.5	0.4	2.5	A	25-RF011-AL
	1.0	0.75	4.8	B	25-RF023-BL
	1.5	1.1	6.0	B	25-RF023-BL
200…240V 50/60 Hz 1-Phase	0.25	0.2	1.6	A	25-RF011-AL
	0.5	0.4	2.5	A	25-RF011-AL
	1.0	0.75	4.8	A	25-RF011-AL
	2.0	1.5	8.0	B	25-RF023-BL
	3.0	2.2	11.0	B	25-RF023-BL
200…240V 50/60 Hz 3-Phase	0.25	0.2	1.6	A	25-RF014-AL
	0.5	0.4	2.5	A	25-RF014-AL
	1.0	0.75	5.0	A	25-RF014-AL
	2.0	1.5	8.0	A	25-RF014-AL
	3.0	2.2	11.0	A	25-RF014-AL
	5.0	4.0	17.5	B	25-RF021-BL
	7.5	5.5	24.0	C	25-RF027-CL
	10.0	7.5	32.2	D	25-RF035-DL
	15.0	11.0	48.3	E	25-RF056-EL
	20.0	15.0	62.1	E	25-RF056-EL
380…480V 50/60 Hz 3-Phase	0.5	0.4	1.4	A	25-RF7P5-AL
	1.0	0.75	2.3	A	25-RF7P5-AL
	2.0	1.5	4.0	A	25-RF7P5-AL
	3.0	2.2	6.0	A	25-RF7P5-AL
	5.0	4.0	10.5	B	25-RF014-BL
	7.5	5.5	13.0	C	25-RF018-CL
	10.0	7.5	17.0	C	25-RF018-CL
	15.0	11.0	24.0	D	25-RF033-DL
	20.0	15.0	30.0	D	25-RF033-DL
	25.0	18.5	37.0	E	25-RF039-EL
	30.0	22.0	43.0	E	25-RF039-EL(1)
525…600V 50/60 Hz 3-Phase	0.5	0.4	0.9	A	25-RF8P0-BL(2)
	1.0	0.75	1.7	A	25-RF8P0-BL(2)
	2.0	1.5	3.0	A	25-RF8P0-BL(2)
	3.0	2.2	4.2	A	25-RF8P0-BL(2)
	5.0	4.0	6.6	B	25-RF8P0-BL
	7.5	5.5	9.9	C	25-RF014-CL
	10.0	7.5	12.0	C	25-RF014-CL
	15.0	11.0	19.0	D	25-RF027-DL
	20.0	15.0	22.0	D	25-RF027-DL
	25.0	18.5	27.0	E	25-RF029-EL
	30.0	22.0	32.0	E	25-RF029-EL(1)

(1) EMC Line Filter size is based on the input current of the drive. See the tables on page 28 and page 29 for more information.

(2) This 600V drive rating needs to be matched with a frame B EMC Line Filter.

EMC Plates

Item	Description	Frame Size	Catalog No.
EMC Plate	Optional grounding plate for shielded cables.	A	25-EMC1-FA
		B	25-EMC1-FB
		C	25-EMC1-FC
		D	25-EMC1-FD
		E	25-EMC1-FE

Human Interface Module (HIM) Option Kits and Accessories

Item	Description	Catalog No.
LCD Display, Remote Panel Mount	Digital speed control CopyCat capable IP66 (NEMA Type 4X/12) indoor use only Includes 2.9 meter cable	22-HIM-C2S
LCD Display, Remote Handheld	Digital speed control Full numeric keyboard CopyCat capable IP 30 (NEMA Type 1) Includes 1.0 meter cable Panel mount with optional Bezel Kit	22-HIM-A3
Bezel Kit	Panel mount for LCD Display, Remote Handheld unit, IP 30 (NEMA Type 1) Includes 2.0 m DSI cable	22-HIM-B1
DSI HIM Cable (DSI HIM to RJ45 cable)	1.0 m (3.3 ft)	22-HIM-H10
	2.9 m (9.51 ft)	22-HIM-H30

IP 30/NEMA 1/UL Type 1 Kit

Item	Description	Frame Size	Catalog No.
IP 30/NEMA 1/UL Type 1 Kit	Field installed kit. Converts drive to IP 30/NEMA 1/UL Type 1 enclosure. Includes conduit box with mounting screws and plastic top panel.	A	25-JBAA
		B	25-JBAB
		C	25-JBAC
		D	25-JBAD
		E	25-JBAE

Control Module Fan Kit

Item	Description	Frame Size	Catalog No.
Control Module Fan Kit	For use with drive in environments with ambient temperatures up to 70 °C or horizontal mounting.	A…D	25-FAN1-70C
		E	25-FAN2-70C

Incremental Encoder Input Option

Item	Description	Catalog No.
Incremental Encoder	Incremental encoder input option board.	25-ENC-1

Bulletin 160 to PowerFlex 520-Series Mounting Adapter Plate

Item	Description	B160 Frame Size	Catalog No.
Mounting Adapter Plate	For use with drive when replacing Bulletin 160 drives in existing installations to a PowerFlex 520-Series drive. Select the catalog number based on the frame size of your Bulletin 160 drive.	A	25-MAP-FA
		B	25-MAP-FB

Replacement Parts

PowerFlex 520-Series Power Module

Item	Description
PowerFlex 520-Series Power Module	Replacement power module for use with PowerFlex 520-Series drives. Includes: • Power Module • Power Module Front Cover • Power Terminal Guard • Heatsink Fan

Output Ratings					Input Voltage Range	Frame Size	Catalog No.
Normal Duty		Heavy Duty		Output Current (A)			
HP	kW	HP	kW				
100…120V AC (-15%, +10%) – 1-Phase Input, 0…230V 3-Phase Output							
0.25	0.2	0.25	0.2	1.6	85…132	A	25-PM1-V1P6
0.5	0.4	0.5	0.4	2.5	85…132	A	25-PM1-V2P5
1.0	0.75	1.0	0.75	4.8	85…132	B	25-PM1-V4P8
1.5	1.1	1.5	1.1	6.0	85…132	B	25-PM1-V6P0
200…240V AC (-15%, +10%) – 1-Phase Input, 0…230V 3-Phase Output							
0.25	0.2	0.25	0.2	1.6	170…264	A	25-PM1-A1P6
0.5	0.4	0.5	0.4	2.5	170…264	A	25-PM1-A2P5
1.0	0.75	1.0	0.75	4.8	170…264	A	25-PM1-A4P8
2.0	1.5	2.0	1.5	8.0	170…264	B	25-PM1-A8P0
3.0	2.2	3.0	2.2	11.0	170…264	B	25-PM1-A011
200…240V AC (-15%, +10%) – 1-Phase Input with EMC Filter, 0…230V 3-Phase Output							
0.25	0.2	0.25	0.2	1.6	170…264	A	25-PM2-A1P6
0.5	0.4	0.5	0.4	2.5	170…264	A	25-PM2-A2P5
1.0	0.75	1.0	0.75	4.8	170…264	A	25-PM2-A4P8
2.0	1.5	2.0	1.5	8.0	170…264	B	25-PM2-A8P0
3.0	2.2	3.0	2.2	11.0	170…264	B	25-PM2-A011
200…240V AC (-15%, +10%) – 3-Phase Input, 0…230V 3-Phase Output							
0.25	0.2	0.25	0.2	1.6	170…264	A	25-PM1-B1P6
0.5	0.4	0.5	0.4	2.5	170…264	A	25-PM1-B2P5
1.0	0.75	1.0	0.75	5.0	170…264	A	25-PM1-B5P0
2.0	1.5	2.0	1.5	8.0	170…264	A	25-PM1-B8P0
3.0	2.2	3.0	2.2	11.0	170…264	A	25-PM1-B011
5.0	4.0	5.0	4.0	17.5	170…264	B	25-PM1-B017
7.5	5.5	7.5	5.5	24.0	170…264	C	25-PM1-B024
10.0	7.5	10.0	7.5	32.2	170…264	D	25-PM1-B032
15.0	11.0	15.0	11.0	48.3	170…264	E	25-PM1-B048
20.0	15.0	15.0	11.0	62.1	170…264	E	25-PM1-B062
380…480V AC (-15%, +10%) – 3-Phase Input, 0…460V 3-Phase Output							
0.5	0.4	0.5	0.4	1.4	323…528	A	25-PM1-D1P4
1.0	0.75	1.0	0.75	2.3	323…528	A	25-PM1-D2P3

Output Ratings					**Input Voltage Range**	**Frame Size**	**Catalog No.**
Normal Duty		**Heavy Duty**		**Output Current (A)**			
HP	**kW**	**HP**	**kW**				
2.0	1.5	2.0	1.5	4.0	323…528	A	25-PM1-D4P0
3.0	2.2	3.0	2.2	6.0	323…528	A	25-PM1-D6P0
5.0	4.0	5.0	4.0	10.5	323…528	B	25-PM1-D010
7.5	5.5	7.5	5.5	13.0	323…528	C	25-PM1-D013
10.0	7.5	10.0	7.5	17.0	323…528	C	25-PM1-D017
15.0	11.0	15.0	11.0	24.0	323…528	D	25-PM1-D024
20.0	15.0	15.0	11.0	30.0	323…528	D	25-PM1-D030
380…480V AC (-15%, +10%) – 3-Phase Input with EMC Filter, 0…460V 3-Phase Output							
0.5	0.4	0.5	0.4	1.4	323…528	A	25-PM2-D1P4
1.0	0.75	1.0	0.75	2.3	323…528	A	25-PM2-D2P3
2.0	1.5	2.0	1.5	4.0	323…528	A	25-PM2-D4P0
3.0	2.2	3.0	2.2	6.0	323…528	A	25-PM2-D6P0
5.0	4.0	5.0	4.0	10.5	323…528	B	25-PM2-D010
7.5	5.5	7.5	5.5	13.0	323…528	C	25-PM2-D013
10.0	7.5	10.0	7.5	17.0	323…528	C	25-PM2-D017
15.0	11.0	15.0	11.0	24.0	323…528	D	25-PM2-D024
20.0	15.0	15.0	11.0	30.0	323…528	D	25-PM2-D030
25.0	18.5	20.0	15.0	37.0	323…528	E	25-PM2-D037
30.0	22.0	25.0	18.5	43.0	323…528	E	25-PM2-D043
525…600V AC (-15%, +10%) – 3-Phase Input, 0…575V 3-Phase Output							
0.5	0.4	0.5	0.4	0.9	446…660	A	25-PM1-E0P9
1.0	0.75	1.0	0.75	1.7	446…660	A	25-PM1-E1P7
2.0	1.5	2.0	1.5	3.0	446…660	A	25-PM1-E3P0
3.0	2.2	3.0	2.2	4.2	446…660	A	25-PM1-E4P2
5.0	4.0	5.0	4.0	6.6	446…660	B	25-PM1-E6P6
7.5	5.5	7.5	5.5	9.9	446…660	C	25-PM1-E9P9
10.0	7.5	10.0	7.5	12.0	446…660	C	25-PM1-E012
15.0	11.0	15.0	11.0	19.0	446…660	D	25-PM1-E019
20.0	15.0	15.0	11.0	22.0	446…660	D	25-PM1-E022
25.0	18.5	20.0	15.0	27.0	446…660	E	25-PM1-E027
30.0	22.0	25.0	18.5	32.0	446…660	E	25-PM1-E032

PowerFlex 520-Series Control Module

Item	Description	Frame Size	Catalog No.
PowerFlex 523 Control Module	Replacement control module for use with PowerFlex 520-Series drives. Includes: • Control Module • Control Module Front Cover	A…E	25A-CTM1
PowerFlex 525 Control Module			25B-CTM1

Other Parts

Item	Description	Frame Size	Catalog No.
PowerFlex 523 Control Module Front Cover	Replacement cover for the control module I/O terminals, EtherNet/IP and DSI ports.	A…E	25A-CTMFC1
PowerFlex 525 Control Module Front Cover			25B-CTMFC1

Other Parts

Item	Description	Frame Size	Catalog No.
PowerFlex 520-Series Power Module Front Cover	Replacement cover for the PowerFlex 520-Series power module.	B	25-PMFC-FB
		C	25-PMFC-FC
		D	25-PMFC-FD
		E	25-PMFC-FE
PowerFlex 520-Series Power Terminal Guard	Replacement finger guard for power terminals.	A	25-PTG1-FA
		B	25-PTG1-FB
		C	25-PTG1-FC
		D	25-PTG1-FD
		E	25-PTG1-FE
PowerFlex 520-Series Heatsink Fan Kit	Replacement fan for drive power module.	A	25-FAN1-FA
		B	25-FAN1-FB
		C	25-FAN1-FC
		D	25-FAN1-FD
		E	25-FAN1-FE

Communication Option Kits and Accessories

Item	Description	Catalog No.
Communication Adapters	Embedded communication options for use with the PowerFlex 520-Series drives: • DeviceNet™ • Dual Port EtherNet/IP™ • PROFIBUS™ DP-V1	 25-COMM-D 25-COMM-E2P 25-COMM-P
Compact I/O Module	Three channel	1769-SM2
Universal Serial Bus™ (USB) Converter Module	Provides serial communication with DF1 protocol for use with Connected Components Workbench software. Includes: • 2 m USB cable (1) • 20-HIM-H10 cable (1) • 22-HIM-H10 cable (1)	1203-USB
Serial Converter Module (RS485 to RS232)	Provides serial communication with DF1 protocol for use with Connected Components Workbench software. Includes: • DSI to RS232 serial converter (1) • 1203-SFC serial cable (1) • 22-RJ45CBL-C20 cable (1)	22-SCM-232
DSI Cable	2.0 m RJ45 to RJ45 cable, male to male connectors.	22-RJ45CBL-C20
Serial Cable	2.0 m serial cable with a locking low profile connector to connect to the serial converter and a 9-pin sub-miniature D female connector to connect to a computer.	1203-SFC
Splitter Cable	RJ45 one to two port splitter cable (Modbus only)	AK-U0-RJ45-SC1
Terminating Resistors	RJ45 120 Ohm resistors (2 pieces)	AK-U0-RJ45-TR1
Terminal Block	RJ45 Two position terminal block (5 pieces)	AK-U0-RJ45-TB2P
Connected Components Workbench Software (Download or DVD-ROM)	Windows-based software packages for programming and configuring Allen-Bradley drives and other Rockwell Automation products. Compatibility: Windows XP, Windows Vista and Windows 7	http://ab.rockwellautomation.com/programmable-controllers/connected-components-workbench-software

Bulletin 1321-3R Series Line Reactors

Output Ratings(1)				**Input Line Reactor(3)(4)**		**Output Line Reactor(3)(4)**	
Normal Duty (2)		**Heavy Duty**		**IP00 (Open Style)**	**IP11 (NEMA/UL Type 1)**	**IP00 (Open Style)**	**IP11 (NEMA/UL Type 1)**
HP	**kW**	**HP**	**kW**	**Catalog No.**	**Catalog No.**	**Catalog No.**	**Catalog No.**
200...240V 50/60 Hz 3-Phase							
0.25	0.2	0.25	0.2	1321-3R2-A	1321-3R2-A	1321-3R2-A	1321-3R2-A
0.5	0.4	0.5	0.4	1321-3R2-D	1321-3RA2-D	1321-3R2-D	1321-3RA2-D
1.0	0.75	1.0	0.75	1321-3R4-A	1321-3RA4-A	1321-3R4-A	1321-3RA4-A
2.0	1.5	2.0	1.5	1321-3R8-A	1321-3RA8-A	1321-3R8-A	1321-3RA8-A
3.0	2.2	3.0	2.2	1321-3R12-A	1321-3RA12-A	1321-3R12-A	1321-3RA12-A
5.0	4.0	5.0	4.0	1321-3R18-A	1321-3RA18-A	1321-3R18-A	1321-3RA18-A
7.5	5.5	7.5	5.5	1321-3R25-A	1321-3RA25-A	1321-3R25-A	1321-3RA25-A
10.0	7.5	10.0	7.5	1321-3R35-A	1321-3RA35-A	1321-3R35-A	1321-3RA35-A
15.0	11.0	15.0	11.0	1321-3R45-A	1321-3RA45-A	1321-3R45-A	1321-3RA45-A
20.0	15.0	15.0	11.0	1321-3R55-A (ND) 1321-3R45-A (HD)	1321-3RA55-A (ND) 1321-3RA45-A (HD)	1321-3R55-A	1321-3RA55-A
380...480V 50/60 Hz 3-Phase							
0.5	0.4	0.5	0.4	1321-3R1-C	1321-3RA1-C	1321-3R2-B	1321-3RA2-B
1.0	0.75	1.0	0.75	1321-3R2-A	1321-3RA2-A	1321-3R2-A	1321-3RA2-A
2.0	1.5	2.0	1.5	1321-3R4-B	1321-3RA4-B	1321-3R4-B	1321-3RA4-B
3.0	2.2	3.0	2.2	1321-3R8-C	1321-3RA8-C	1321-3R8-C	1321-3RA8-C
5.0	4.0	5.0	4.0	1321-3R8-B	1321-3RA8-B	1321-3R8-B	1321-3RA8-B
7.5	5.5	7.5	5.5	1321-3R12-B	1321-3RA12-B	1321-3R12-B	1321-3RA12-B
10.0	7.5	10.0	7.5	1321-3R18-B	1321-3RA18-B	1321-3R18-B	1321-3RA18-B
15.0	11.0	15.0	11.0	1321-3R25-B	1321-3RA25-B	1321-3R25-B	1321-3RA25-B
20.0	15.0	15.0	11.0	1321-3R35-B (ND) 1321-3R25-B (HD)	1321-3RA35-B (ND) 1321-3RA25-B (HD)	1321-3R25-B	1321-3RA25-B
25.0	18.5	20.0	15.0	1321-3R35-B	1321-3RA35-B	1321-3R35-B	1321-3RA35-B
30.0	22.0	25.0	18.5	1321-3R45-B (ND) 1321-3R35-B (HD)	1321-3RA45-B (ND) 1321-3RA35-B (HD)	1321-3R45-B	1321-3RA45-B
525...600V 50/60 Hz 3-Phase							
0.5	0.4	0.5	0.4	1321-3R2-B	1321-3RA2-B	1321-3R2-B	1321-3RA2-B
1.0	0.75	1.0	0.75	1321-3R2-B	1321-3RA2-B	1321-3R2-B	1321-3RA2-B
2.0	1.5	2.0	1.5	1321-3R4-D	1321-3RA4-D	1321-3R4-D	1321-3RA4-D
3.0	2.2	3.0	2.2	1321-3R4-C	1321-3RA4-C	1321-3R4-C	1321-3RA4-C
5.0	4.0	5.0	4.0	1321-3R8-C	1321-3RA8-C	1321-3R8-C	1321-3RA8-C
7.5	5.5	7.5	5.5	1321-3R12-C	1321-3RA12-C	1321-3R12-C	1321-3RA12-C
10.0	7.5	10.0	7.5	1321-3R12-B	1321-3RA12-B	1321-3R12-B	1321-3RA12-B
15.0	11.0	15.0	11.0	1321-3R18-B	1321-3RA18-B	1321-3R18-B	1321-3RA18-B
20.0	15.0	15.0	11.0	1321-3R25-B (ND) 1321-3R18-B (HD)	1321-3RA25-B (ND) 1321-3RA18-B (HD)	1321-3R25-B	1321-3RA25-B
25.0	18.5	20.0	15.0	1321-3R35-C (ND) 1321-3R25-B (HD)	1321-3RA35-C (ND) 1321-3RA25-B (HD)	1321-3R35-C	1321-3RA35-C
30.0	22.0	25.0	18.5	1321-3R35-B (ND) 1321-3R35-C (HD)	1321-3RA35-B (ND) 1321-3RA35-C (HD)	1321-3R35-B	1321-3RA35-B

(1) Normal Duty and Heavy Duty ratings for 15 HP / 11 kW and below are identical

(2) Normal Duty ratings are only available for PowerFlex 525 drives.

(3) Catalog numbers listed are for 3% impedance. 5% impedance reactor types are also available. See publication 1321-TD001.

(4) Input line reactors were sized based on the NEC fundamental motor amps. Output line reactors were sized based on the VFD rated output currents.

Product Dimensions

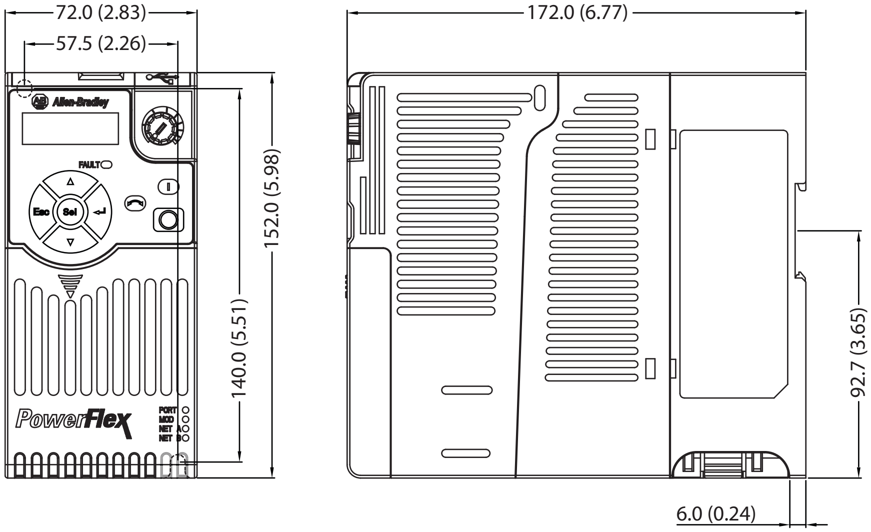
The PowerFlex 520-series drive is available in five frame sizes. See the PowerFlex 523 Drive Ratings on page 163 and PowerFlex 525 Drive Ratings on page 164 for information on power ratings.

PowerFlex 520-Series Drive Weight

Frame Size	Weight (kg/lb.)
A	1.1 / 2.4
B	1.6 / 3.5
C	2.3 / 5.0
D	3.9 / 8.6
E	12.9 / 28.4

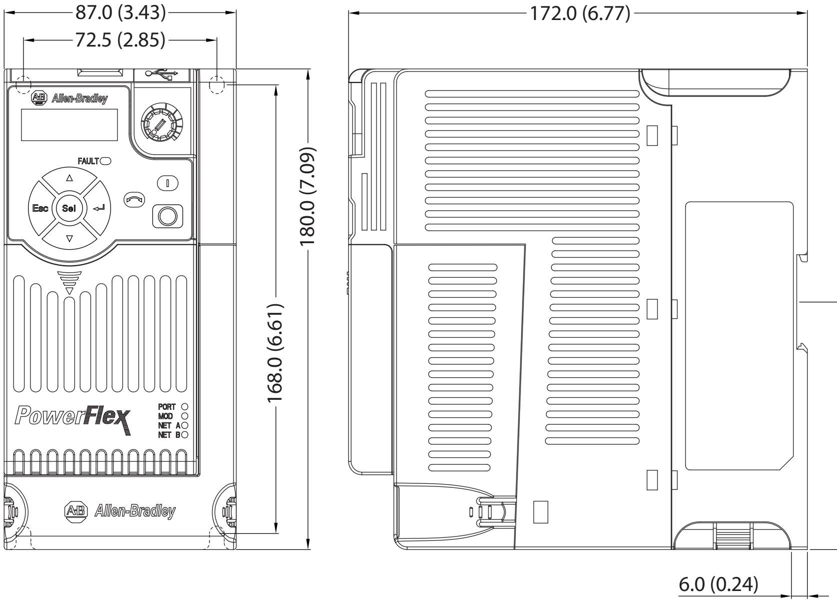
IP 20/Open Type – Frame A

Dimensions are in millimeters and (inches)


72.0 (2.83)
57.5 (2.26)
152.0 (5.98)
140.0 (5.51)
172.0 (6.77)
92.7 (3.65)
6.0 (0.24)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B

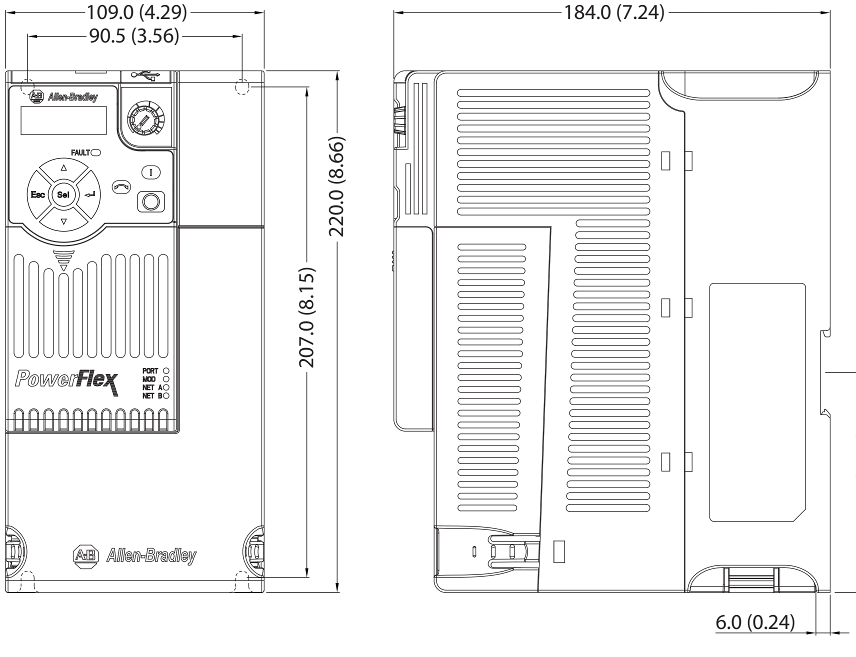
IP 20/Open Type – Frame B

Dimensions are in millimeters and (inches)


87.0 (3.43)
72.5 (2.85)
180.0 (7.09)
168.0 (6.61)
172.0 (6.77)
92.7 (3.65)
6.0 (0.24)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B

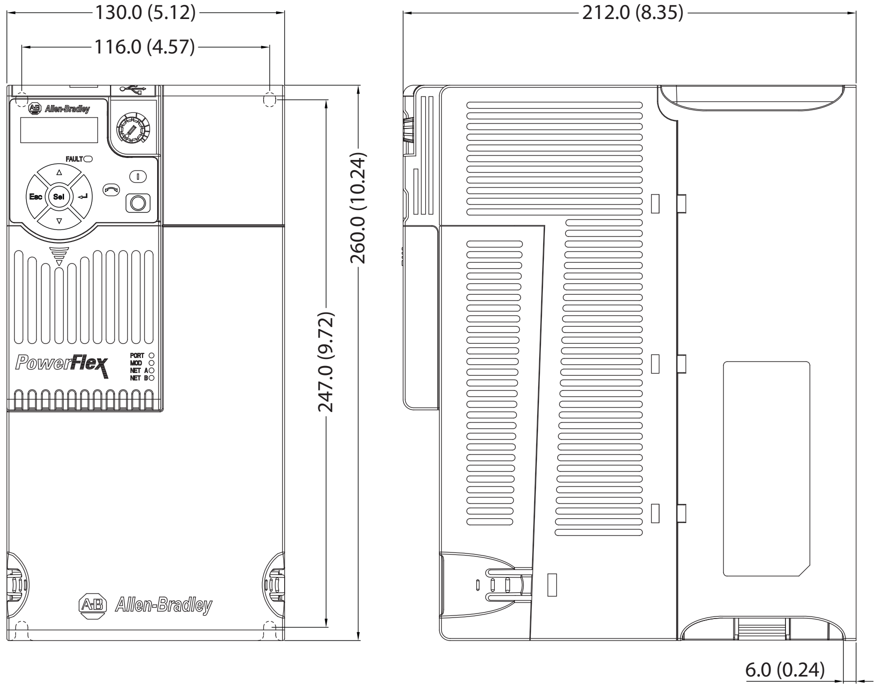
IP 20/Open Type – Frame C

Dimensions are in millimeters and (inches)


109.0 (4.29)
90.5 (3.56)
220.0 (8.66)
207.0 (8.15)
184.0 (7.24)
92.7 (3.65)
6.0 (0.24)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B

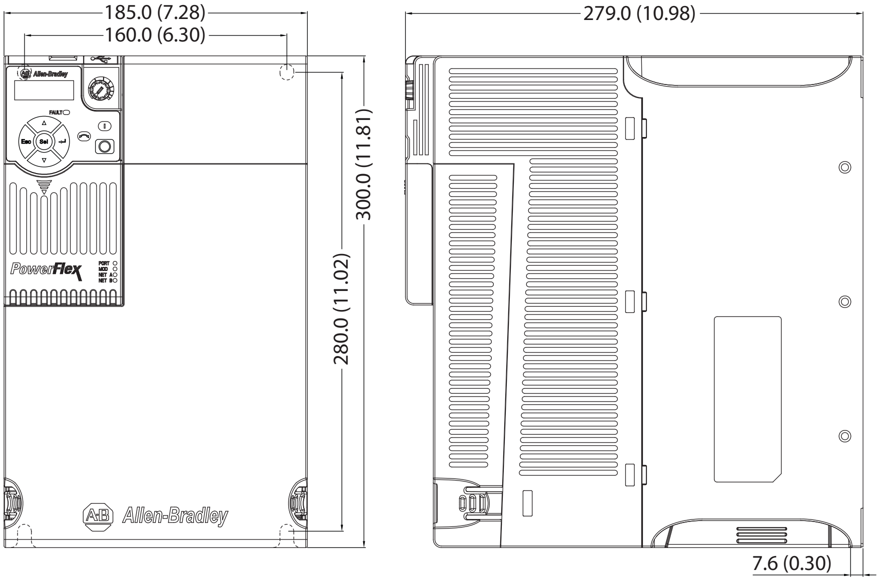
IP 20/Open Type – Frame D

Dimensions are in millimeters and (inches)


130.0 (5.12)
116.0 (4.57)
212.0 (8.35)
260.0 (10.24)
247.0 (9.72)
6.0 (0.24)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B
Allen-Bradley

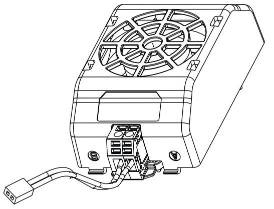
IP 20/Open Type – Frame E

Dimensions are in millimeters and (inches)

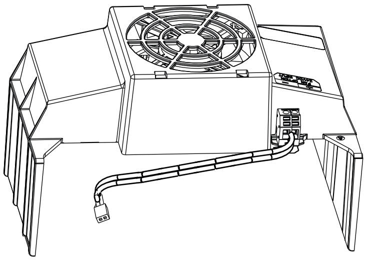

185.0 (7.28)
160.0 (6.30)
279.0 (10.98)
300.0 (11.81)
280.0 (11.02)
7.6 (0.30)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B
Allen-Bradley

Control Module Fan Kit

25-FAN1-70C



25-FAN2-70C

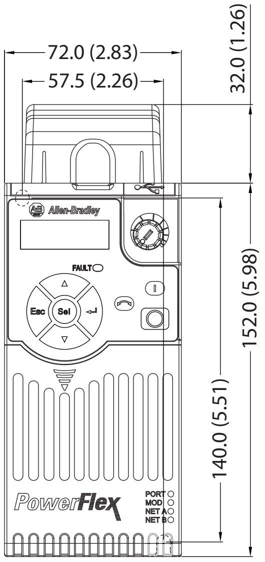


Specifications	25-FAN1-70C	25-FAN2-70C
Rated Voltage	24V DC	
Operation Voltage	14…27.6V DC	
Input Current	0.1 A	0.15 A
Speed (Reference)	7000 rpm	4500 ± 10% rpm
Maximum Air Flow (At zero static pressure)	0.575 m^3/min	1.574 m^3/min
Maximum Air Pressure (At zero air flow)	7.70 mmH_2O	9.598 mmH_2O
Acoustical Noise	40.5 dB-A	46.0 dB-A
Insulation Type	UL Class A	
Frame Size	Frame A…D	Frame E
Wire Size	0.32 mm^2 (22 AWG)	
Torque	0.29…0.39 Nm (2.6…3.47 lb-in.)	

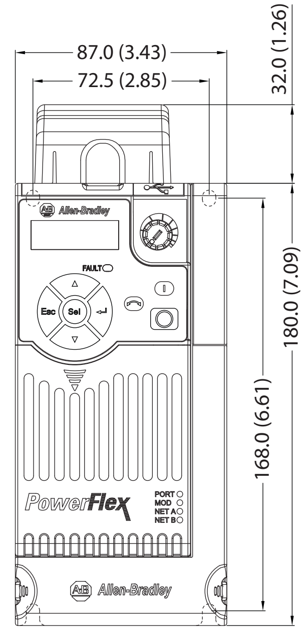
IP 20/Open Type with Control Module Fan Kit – Frame A…C

Dimensions are in millimeters and (inches)

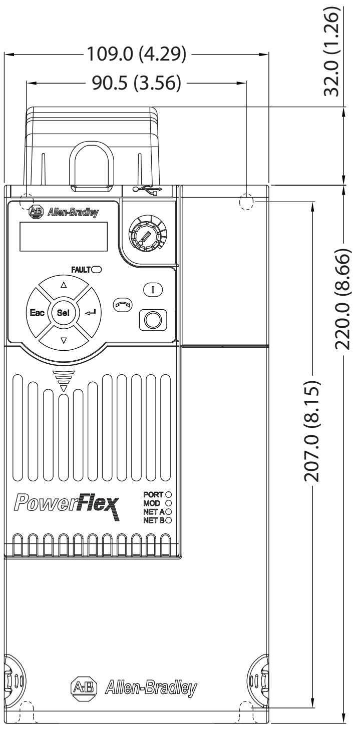
Frame A


72.0 (2.83)
57.5 (2.26)
32.0 (1.26)
152.0 (5.98)
140.0 (5.51)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B

Frame B


87.0 (3.43)
72.5 (2.85)
32.0 (1.26)
180.0 (7.09)
168.0 (6.61)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B
Allen-Bradley

Frame C

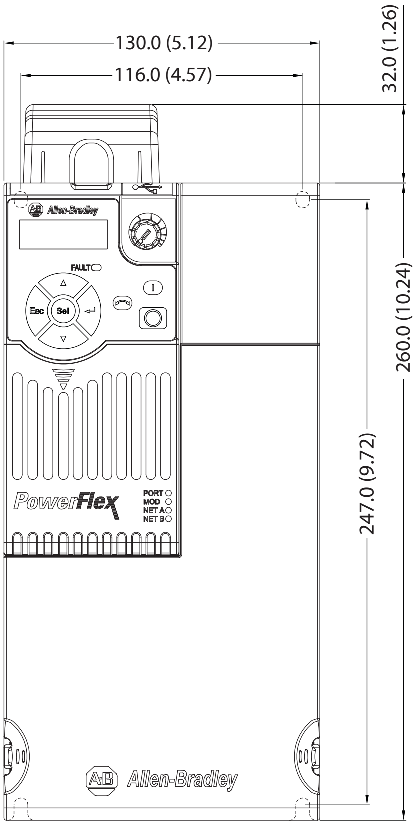

109.0 (4.29)
90.5 (3.56)
32.0 (1.26)
220.0 (8.66)
207.0 (8.15)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B
Allen-Bradley

IMPORTANT	An external 24V DC power source is required when using the Control Module Fan Kit with drive frames A, B, and C.

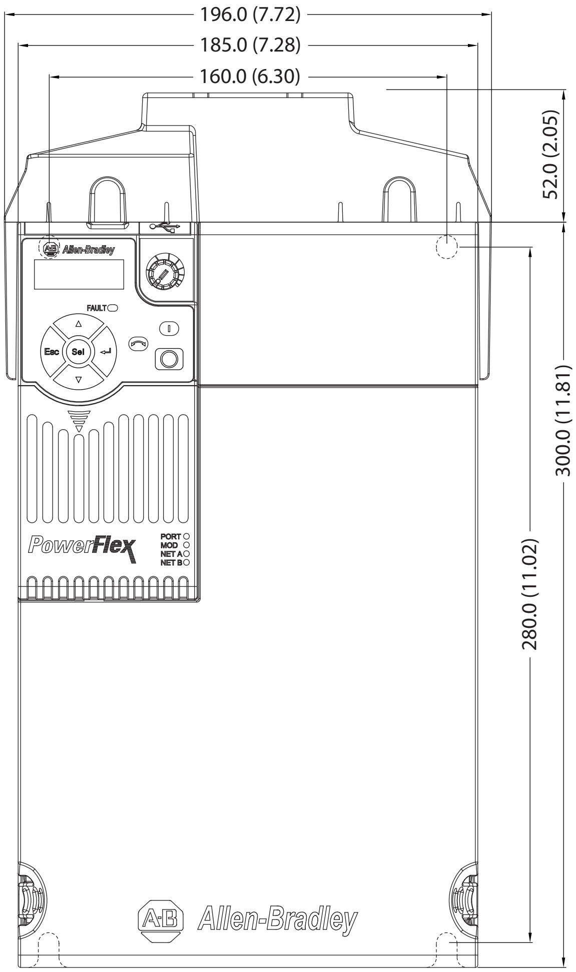
IP 20/Open Type with Control Module Fan Kit – Frame D...E

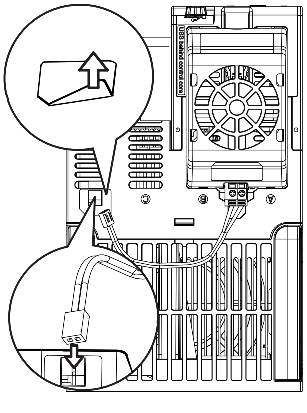
Dimensions are in millimeters and (inches)

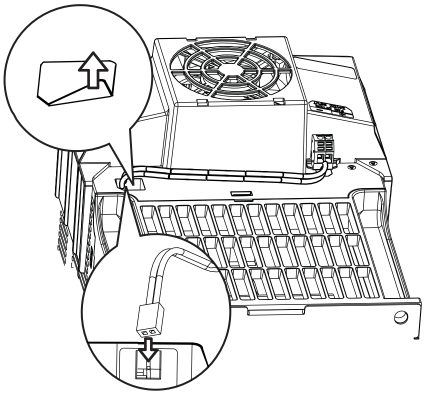
Frame D


130.0 (5.12)
116.0 (4.57)
32.0 (1.26)
260.0 (10.24)
247.0 (9.72)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B

Frame E


196.0 (7.72)
185.0 (7.28)
160.0 (6.30)
52.0 (2.05)
300.0 (11.81)
280.0 (11.02)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B

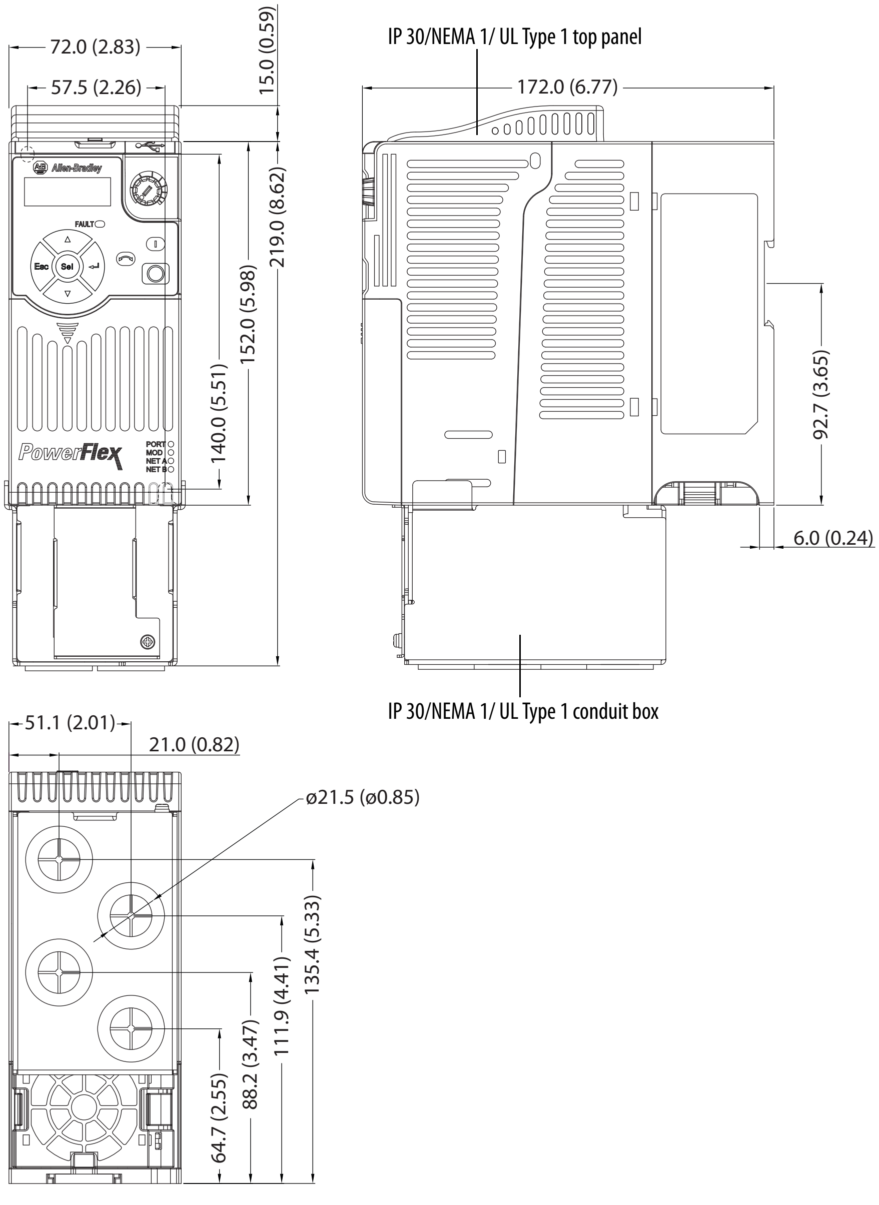




IMPORTANT Remove the label to access the built-in 24V supply on drive frames D and E for use with the Control Module Fan Kit.

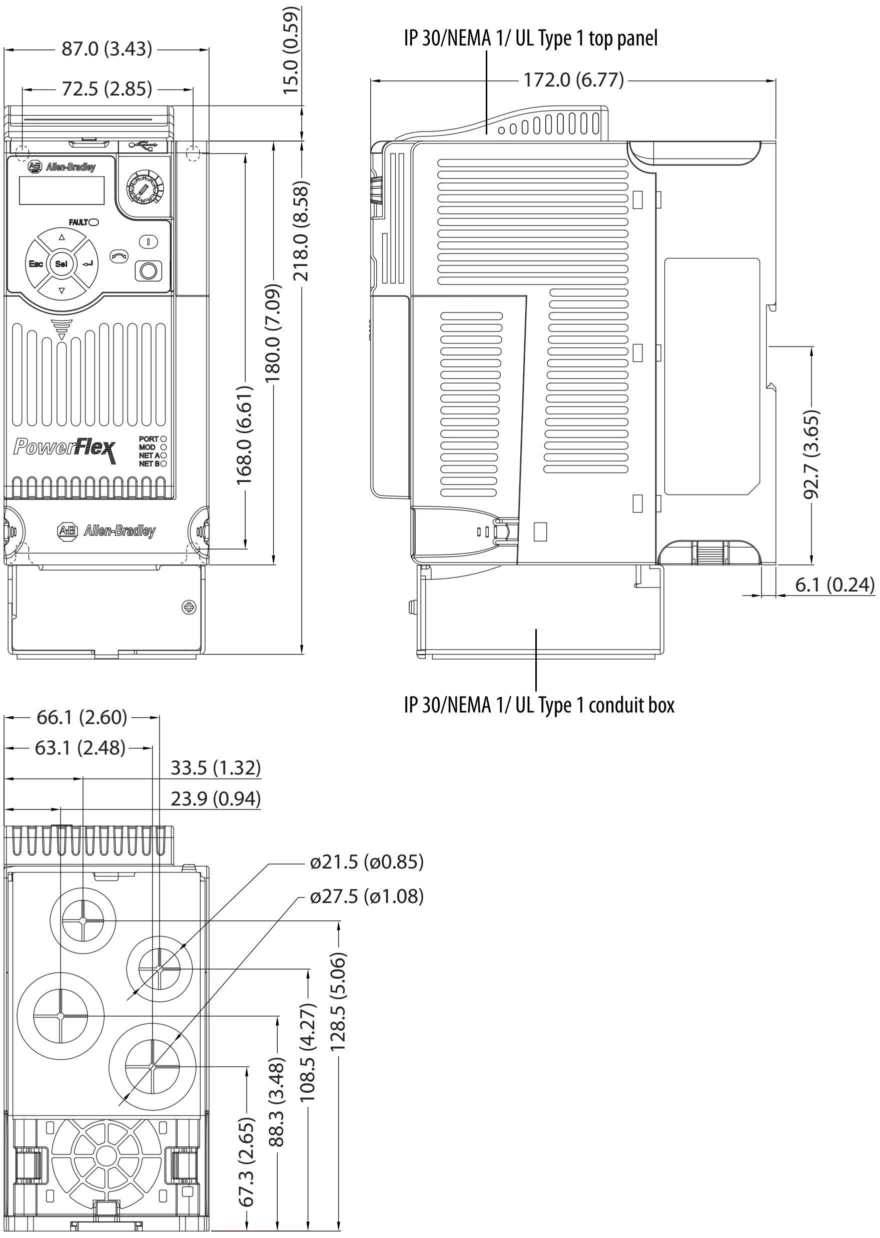
IP 30/NEMA 1/UL Type 1 – Frame A

Dimensions are in millimeters and (inches)


72.0 (2.83)
57.5 (2.26)
15.0 (0.59)
219.0 (8.62)
152.0 (5.98)
140.0 (5.51)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B
IP 30/NEMA 1/ UL Type 1 top panel
172.0 (6.77)
92.7 (3.65)
6.0 (0.24)
IP 30/NEMA 1/ UL Type 1 conduit box
51.1 (2.01)
21.0 (0.82)
ø21.5 (ø0.85)
135.4 (5.33)
111.9 (4.41)
88.2 (3.47)
64.7 (2.55)

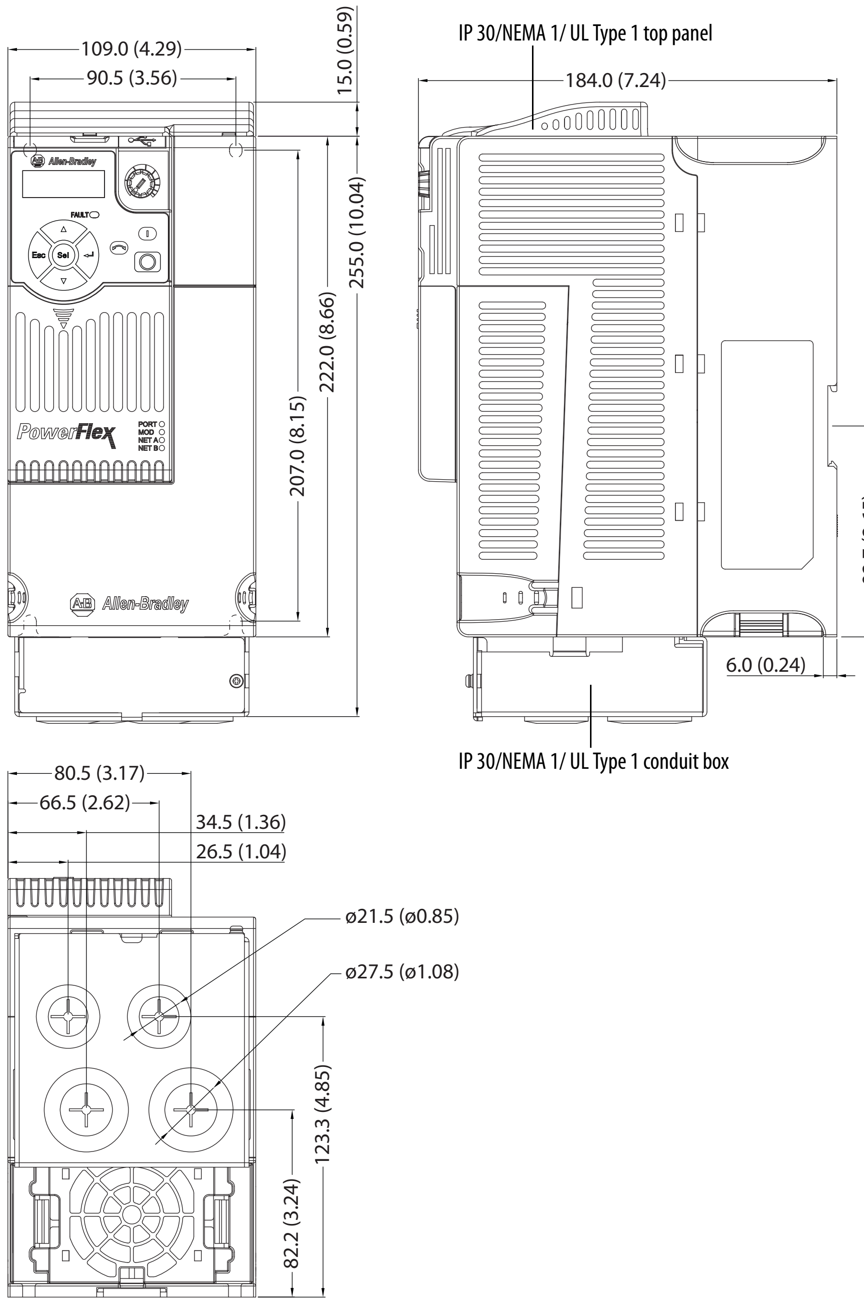
IP 30/NEMA 1/UL Type 1 – Frame B

Dimensions are in millimeters and (inches)


87.0 (3.43)
72.5 (2.85)
15.0 (0.59)
218.0 (8.58)
180.0 (7.09)
168.0 (6.61)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B
IP 30/NEMA 1/ UL Type 1 top panel
172.0 (6.77)
92.7 (3.65)
6.1 (0.24)
IP 30/NEMA 1/ UL Type 1 conduit box
66.1 (2.60)
63.1 (2.48)
33.5 (1.32)
23.9 (0.94)
ø21.5 (ø0.85)
ø27.5 (ø1.08)
128.5 (5.06)
108.5 (4.27)
88.3 (3.48)
67.3 (2.65)

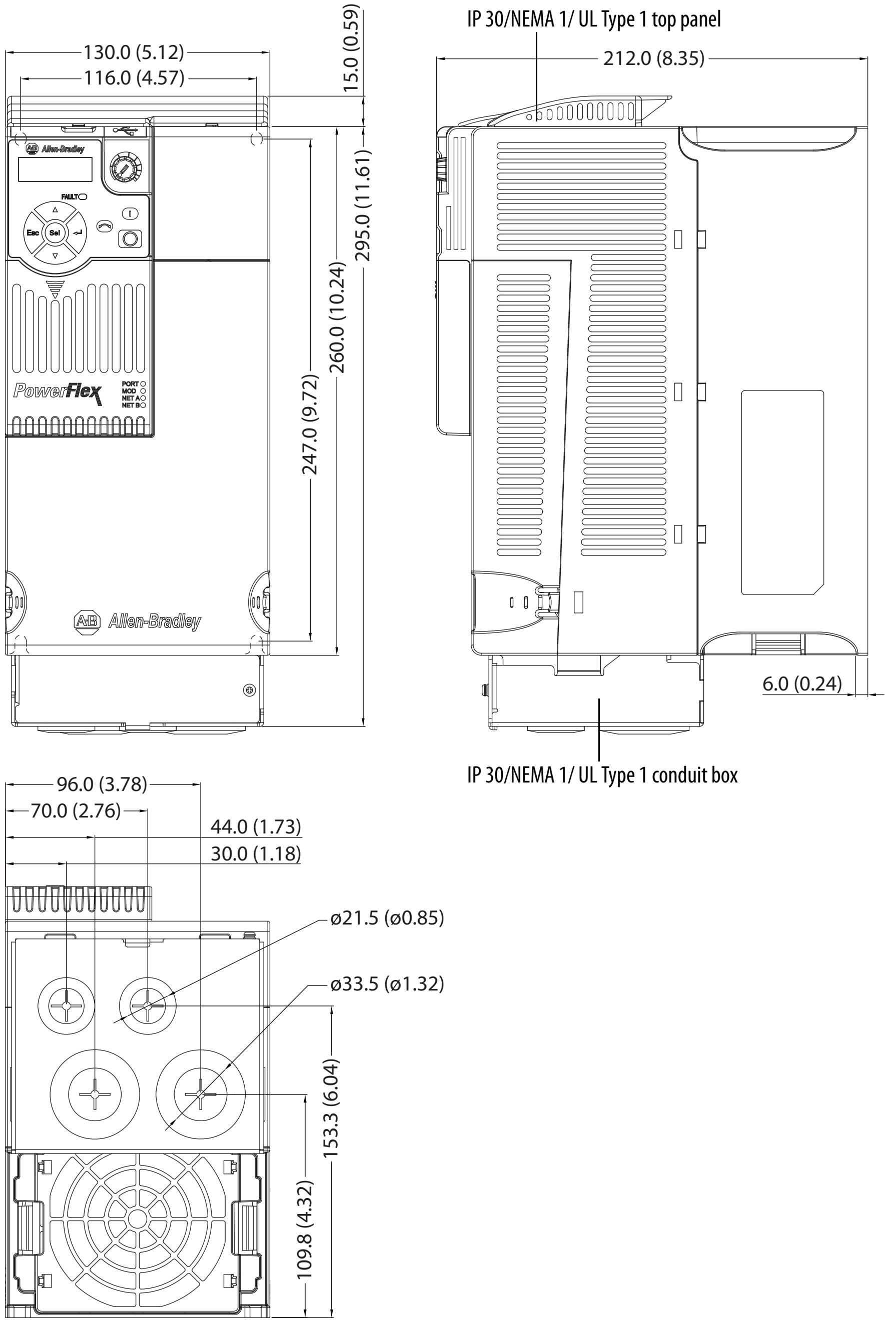
IP 30/NEMA 1/UL Type 1 – Frame C

Dimensions are in millimeters and (inches)


109.0 (4.29)
90.5 (3.56)
15.0 (0.59)
255.0 (10.04)
222.0 (8.66)
207.0 (8.15)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B
IP 30/NEMA 1/ UL Type 1 top panel
184.0 (7.24)
92.7 (3.65)
6.0 (0.24)
IP 30/NEMA 1/ UL Type 1 conduit box
80.5 (3.17)
66.5 (2.62)
34.5 (1.36)
26.5 (1.04)
ø21.5 (ø0.85)
ø27.5 (ø1.08)
123.3 (4.85)
82.2 (3.24)

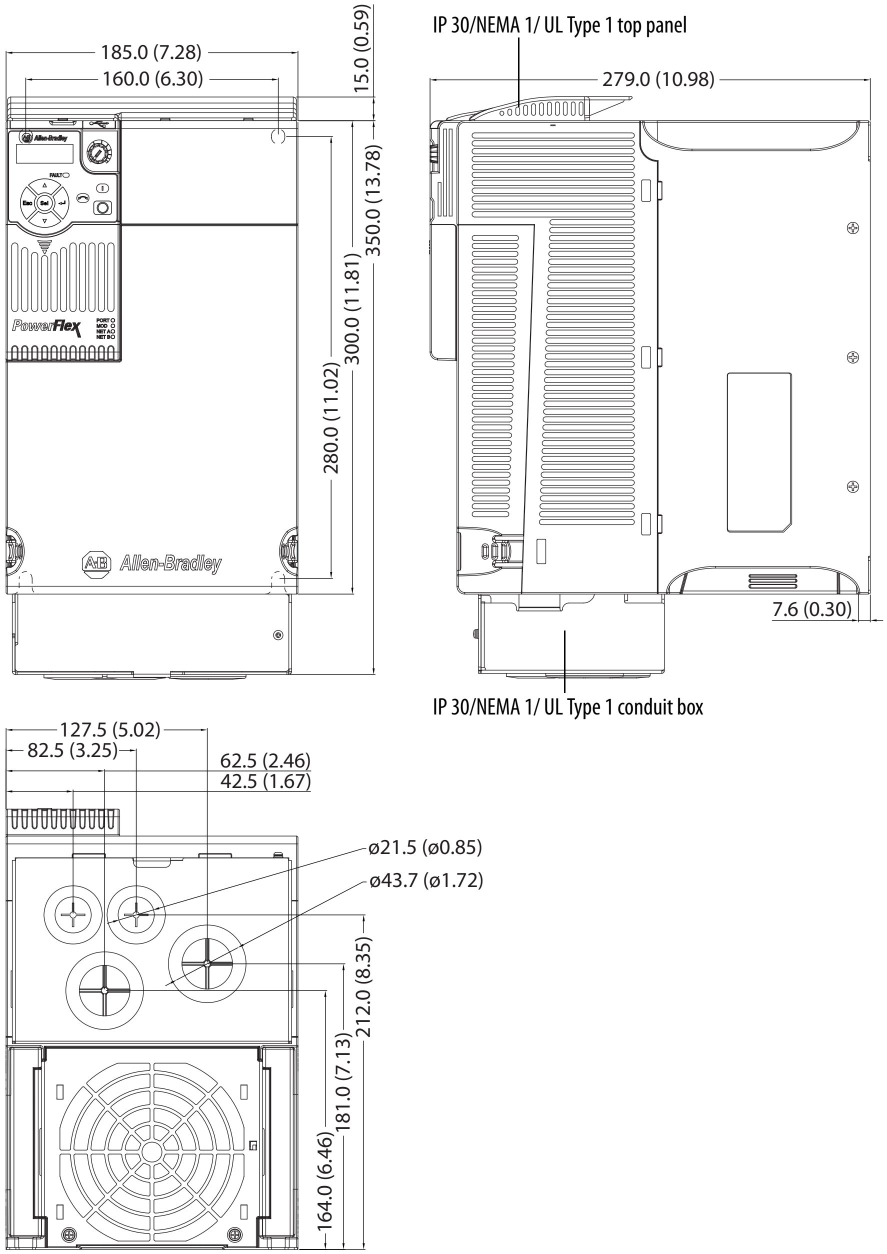
IP 30/NEMA 1/UL Type 1 – Frame D

Dimensions are in millimeters and (inches)


130.0 (5.12)
116.0 (4.57)
15.0 (0.59)
295.0 (11.61)
260.0 (10.24)
247.0 (9.72)
Allen-Bradley
FAULT
Esc
Sel
PowerFlex
PORT
MOD
NET A
NET B
Allen-Bradley
IP 30/NEMA 1/ UL Type 1 top panel
212.0 (8.35)
6.0 (0.24)
IP 30/NEMA 1/ UL Type 1 conduit box
96.0 (3.78)
70.0 (2.76)
44.0 (1.73)
30.0 (1.18)
ø21.5 (ø0.85)
ø33.5 (ø1.32)
153.3 (6.04)
109.8 (4.32)

IP 30/NEMA 1/UL Type 1 – Frame E

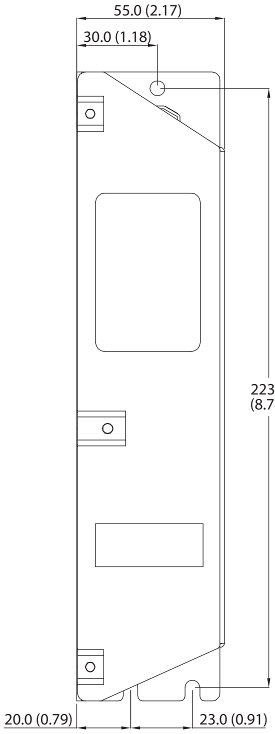
Dimensions are in millimeters and (inches)

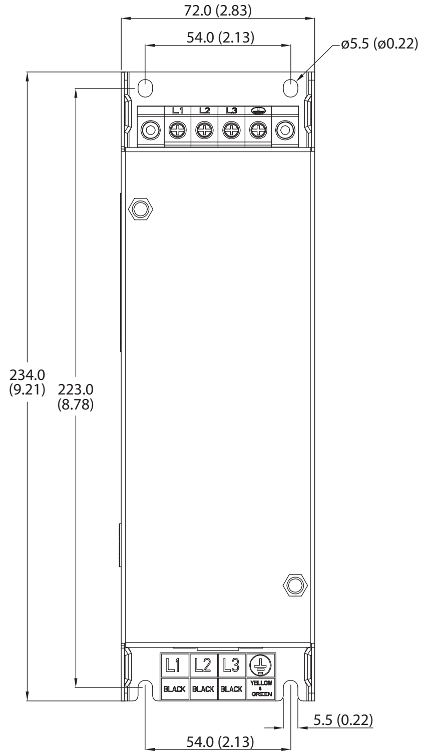

185.0 (7.28)
160.0 (6.30)
15.0 (0.59)
350.0 (13.78)
300.0 (11.81)
280.0 (11.02)
IP 30/NEMA 1/ UL Type 1 top panel
279.0 (10.98)
7.6 (0.30)
IP 30/NEMA 1/ UL Type 1 conduit box
127.5 (5.02)
82.5 (3.25)
62.5 (2.46)
42.5 (1.67)
ø21.5 (ø0.85)
ø43.7 (ø1.72)
212.0 (8.35)
181.0 (7.13)
164.0 (6.46)
PowerFlex
Allen-Bradley

EMC Line Filter – Frame A

Dimensions are in millimeters and (inches)

Filter can be mounted onto the back of the drive.

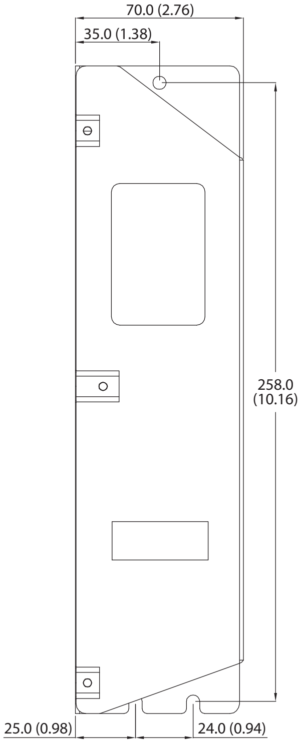

55.0 (2.17)
30.0 (1.18)
223.0
(8.78)
20.0 (0.79)
23.0 (0.91)

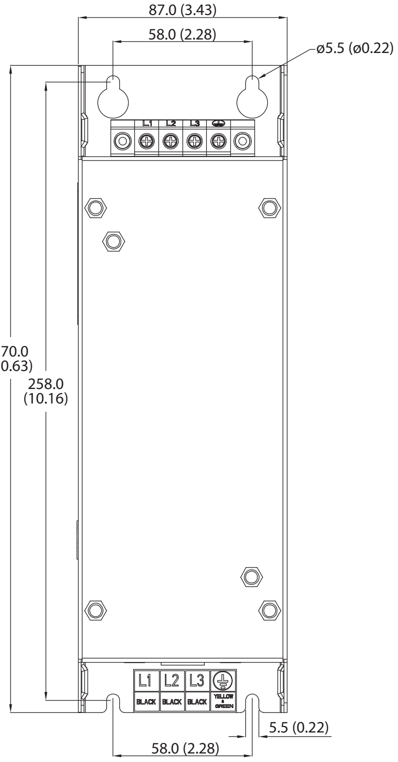

72.0 (2.83)
54.0 (2.13)
ø5.5 (ø0.22)
L1
L2
L3
234.0
(9.21)
223.0
(8.78)
L1
L2
L3
BLACK
BLACK
BLACK
YELLOW & GREEN
5.5 (0.22)
54.0 (2.13)

EMC Line Filter – Frame B

Dimensions are in millimeters and (inches)

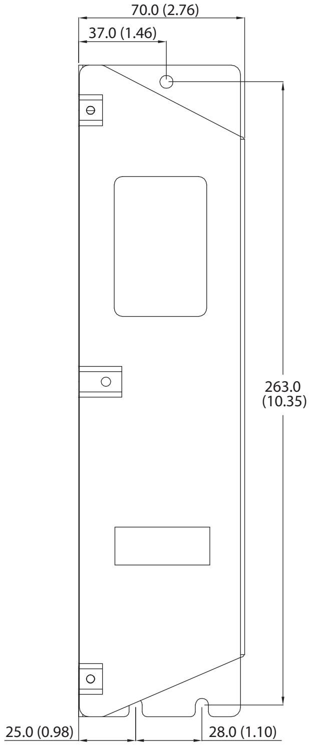
Filter can be mounted onto the back of the drive.


70.0 (2.76)
35.0 (1.38)
258.0
(10.16)
25.0 (0.98)
24.0 (0.94)

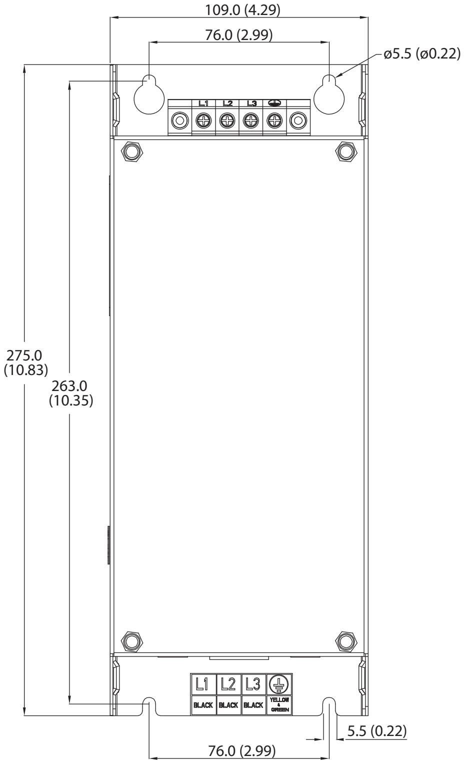

87.0 (3.43)
58.0 (2.28)
ø5.5 (ø0.22)
L1
L2
L3
270.0
(10.63)
258.0
(10.16)
L1
L2
L3
BLACK
BLACK
BLACK
YELLOW & GREEN
5.5 (0.22)
58.0 (2.28)

EMC Line Filter – Frame C

Dimensions are in millimeters and (inches)

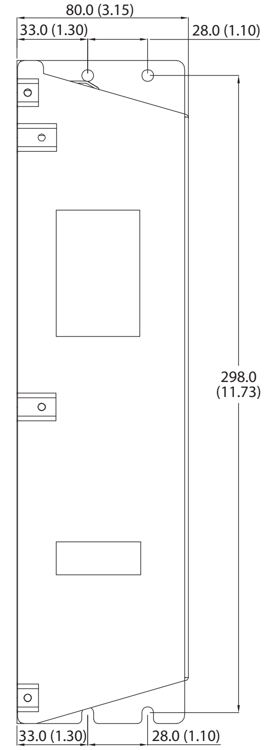

70.0 (2.76)
37.0 (1.46)
263.0 (10.35)
25.0 (0.98)
28.0 (1.10)

Filter can be mounted onto the back of the drive.

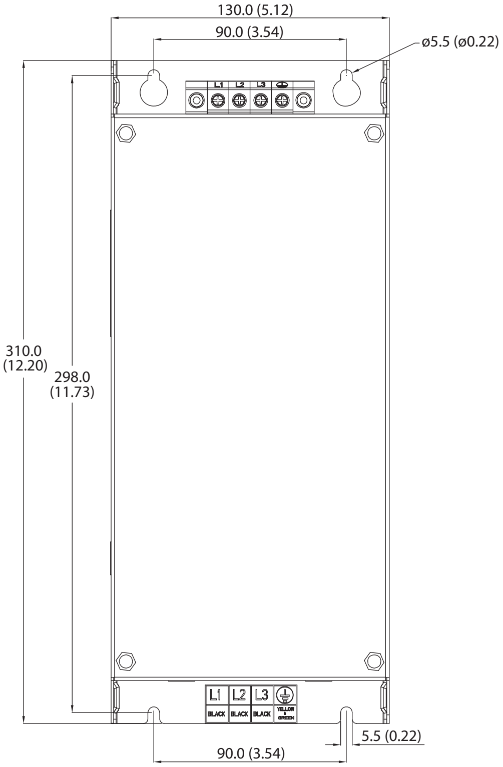

109.0 (4.29)
76.0 (2.99)
ø5.5 (ø0.22)
L1
L2
L3
275.0 (10.83)
263.0 (10.35)
L1
L2
L3
BLACK
BLACK
BLACK
YELLOW & GREEN
5.5 (0.22)
76.0 (2.99)

EMC Line Filter – Frame D

Dimensions are in millimeters and (inches)

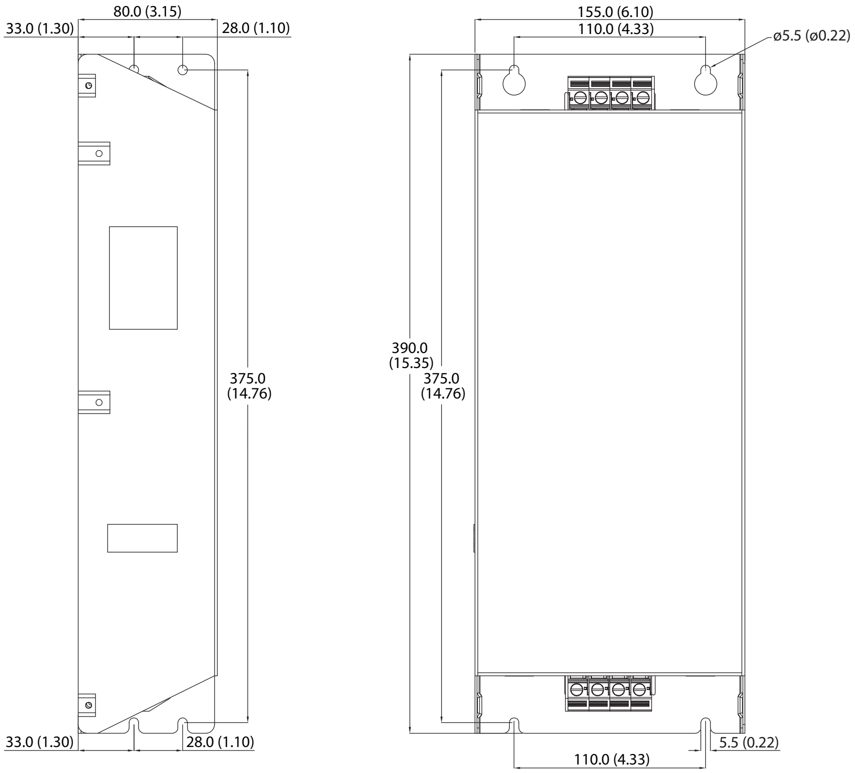

80.0 (3.15)
33.0 (1.30)
28.0 (1.10)
298.0 (11.73)
33.0 (1.30)
28.0 (1.10)

Filter can be mounted onto the back of the drive.


130.0 (5.12)
90.0 (3.54)
ø5.5 (ø0.22)
L1
L2
L3
310.0 (12.20)
298.0 (11.73)
L1
L2
L3
BLACK
BLACK
BLACK
YELLOW & GREEN
5.5 (0.22)
90.0 (3.54)

EMC Line Filter – Frame E

Dimensions are in millimeters and (inches)

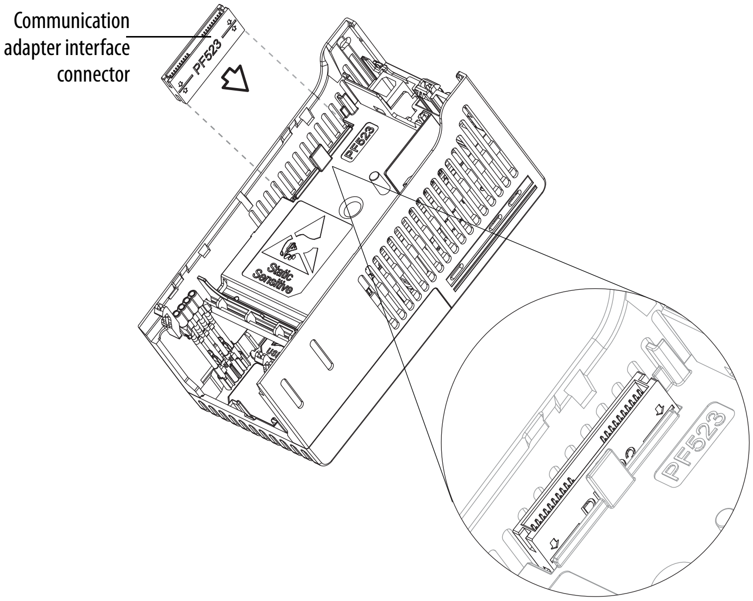

80.0 (3.15)
33.0 (1.30)
28.0 (1.10)
375.0
(14.76)
33.0 (1.30)
28.0 (1.10)
155.0 (6.10)
110.0 (4.33)
ø5.5 (ø0.22)
390.0
(15.35)
375.0
(14.76)
5.5 (0.22)
110.0 (4.33)

Optional Accessories and Kits

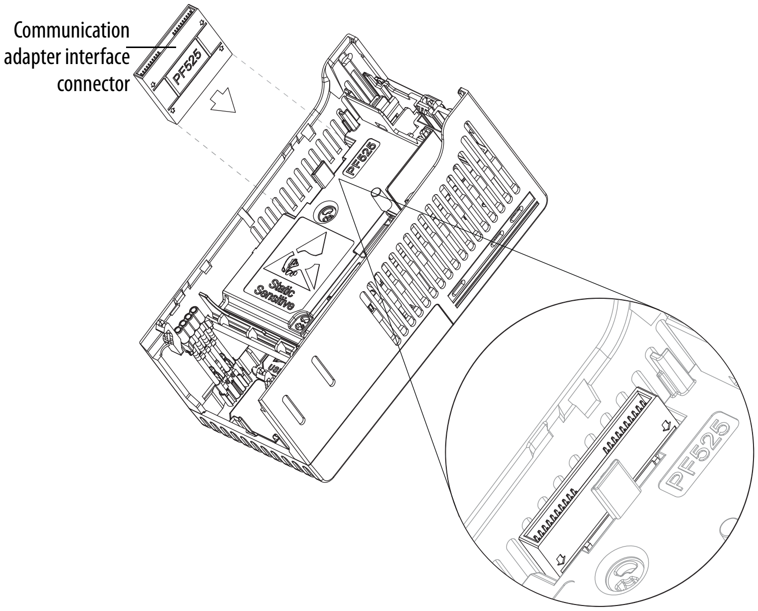
Installing a Communication Adapter

1. Insert the communication adapter interface connector into the Control Module. Make sure the indicator line on the connector is aligned with the surface of the Control Module.

For PowerFlex 523

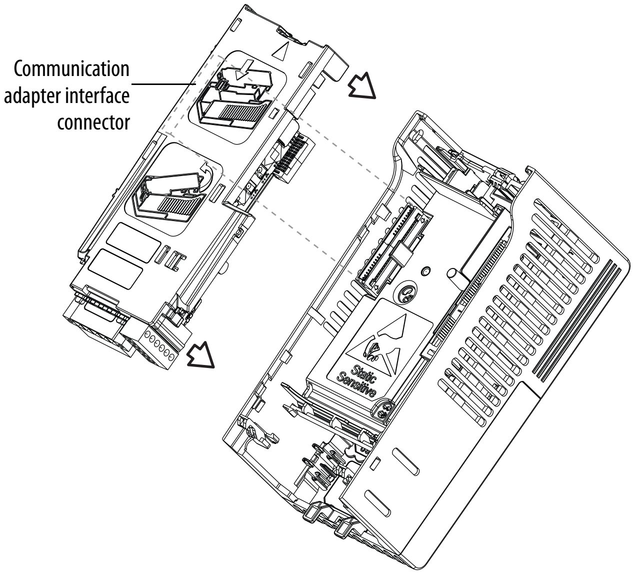

Communication adapter interface connector
PF523
PF523
Static Sensitive
PF523

For PowerFlex 525


Communication adapter interface connector
PF525
PF525
Static Sensitive
PF525

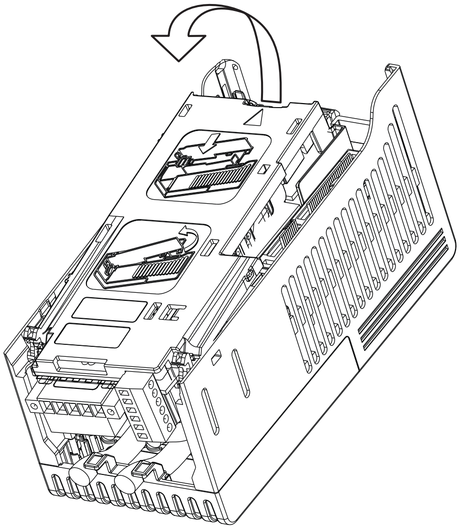
2. Align the connectors on the communication adapter to the communication adapter interface connector, then push the back cover down.

3. Press along the edges of the back cover until it snaps firmly into place.


Communication adapter interface connector
Static Sensitive

Removing a Communication Adapter

1. Insert a finger into the slot at the top of the back cover. Lift to separate the back cover from the Control Module.

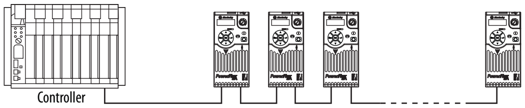


Notes:

RS485 (DSI) Protocol

PowerFlex 520-series drives support the RS485 (DSI) protocol to allow efficient operation with Rockwell Automation peripherals. In addition, some Modbus functions are supported to allow simple networking. PowerFlex 520-series drives can be multi-dropped on an RS485 network using Modbus protocol in RTU mode.

PowerFlex 520-Series Drive Network


Controller

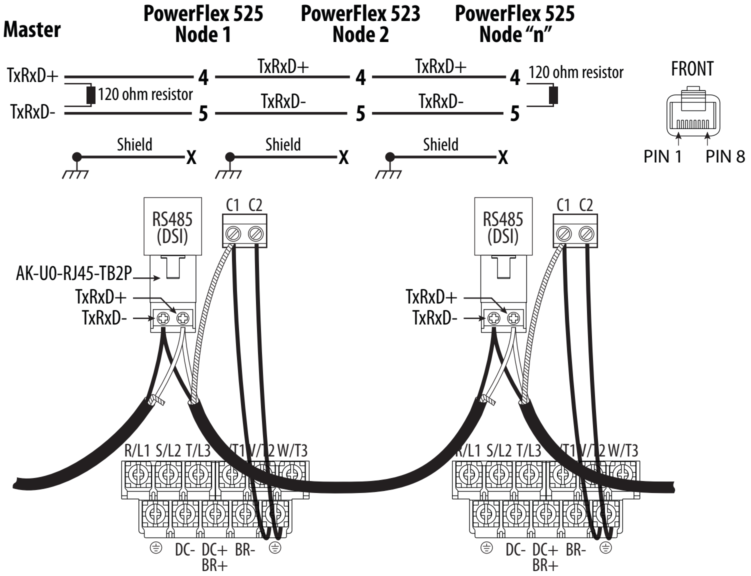
For information regarding EtherNet/IP or other communication protocols, refer to the appropriate user manual.

Network Wiring

Network wiring consists of a shielded 2-conductor cable that is daisy-chained from node to node.

ATTENTION: Never attempt to connect a Power over Ethernet (PoE) cable to the RS485 port. Doing so may damage the circuitry.

Network Wiring Diagram Example


Master
PowerFlex 525
Node 1
PowerFlex 523
Node 2
PowerFlex 525
Node "n"
TxRxD+
TxRxD-
120 ohm resistor
4
5
TxRxD+
TxRxD-
4
5
TxRxD+
TxRxD-
4
5
120 ohm resistor
Shield
X
Shield
X
Shield
X
FRONT
PIN 1
PIN 8
RS485
(DSI)
C1 C2
AK-U0-RJ45-TB2P
TxRxD+
TxRxD-
R/L1 S/L2 T/L3
W/T3
DC- DC+ BR-
BR+
RS485
(DSI)
C1 C2
TxRxD+
TxRxD-
S/L2 T/L3
W/T3
DC- DC+ BR-
BR+

IMPORTANT The shield is connected at ONLY ONE end of each cable segment.

Only pins 4 and 5 on the RJ45 plug should be wired. The other pins on the PowerFlex 520-series drive's RJ45 socket must not be connected because they contain power, etc. for other Rockwell Automation peripheral devices.

Wiring terminations on the master controller will vary depending on the master controller used and "TxRxD+" and "TxRxD-" are shown for illustration purposes only. Refer to the master controller's user manual for network terminations. Note that there is no standard for the "+" and "-" wires, and consequently Modbus device manufacturers interpret them differently. If you have problems with initially establishing communications, try swapping the two network wires at the master controller.

Standard RS485 wiring practices apply.

- Termination resistors need to be applied at each end of the network cable.
- RS485 repeaters may need to be used for long cable runs, or if greater than 32 nodes are needed on the network.
- Network wiring should be separated from power wires by at least 0.3 meters (1 foot).
- Network wiring should only cross power wires at a right angle.

I/O Terminal C1 (RJ45 Shield) on the PowerFlex 520-series drive must also be connected to PE ground (there are two PE terminals on the drive). See I/O Control Terminal Designations on page 41 and page 43 for more information.

I/O Terminal C2 (Comm Common) is internally tied to Network Common, and NOT to RJ45 Shield. Tying I/O Terminal C2 to PE ground may improve noise immunity in some applications.

Parameter Configuration

The following PowerFlex 520-series drive parameters are used to configure the drive to operate on a DSI network.

Configuring Parameters for DSI Network

Parameter	Details	Reference
P046 [Start Source 1]	Set to 3 "Serial/DSI" if Start is controlled from the network.	page 83
P047 [Speed Reference1]	Set to 3 "Serial/DSI" if the Speed Reference is controlled from the network.	page 84
C123 [RS485 Data Rate]	Sets the data rate for the RS485 (DSI) Port. All nodes on the network must be set to the same data rate.	page 97
C124 [RS485 Node Addr]	Sets the node address for the drive on the network. Each device on the network requires a unique node address.	page 97
C125 [Comm Loss Action]	Selects the drive's response to communication problems.	page 97
C126 [Comm Loss Time]	Sets the time that the drive will remain in communication loss before the drive implements C125 [Comm Loss Action].	page 97
C127 [Comm Format]	Sets the transmission mode, data bits, parity and stop bits for the RS485 (DSI) Port. All nodes on the network must be set to the same setting.	page 98
C121 [Comm Write Mode]	Set to 0 "Save" when programming drive. Set to 1 "RAM only" to only write to volatile memory.	page 97

Supported Modbus Function Codes

The peripheral interface (DSI) used on PowerFlex 520-series drives supports some of the Modbus function codes.

Supported Modbus Function Codes

Modbus Function Code (Decimal)	Command
03	Read Holding Registers
06	Preset (Write) Single Register
16 (10 Hexadecimal)	Preset (Write) Multiple Registers

IMPORTANT Modbus devices can be 0-based (registers are numbered starting at 0) or 1-based (registers are numbered starting at 1). Depending on the Modbus Master used, the register addresses listed on the following pages may need to be offset by +1. For example, Logic Command may be register address 8192 for some master devices (e.g. ProSoft 3150-MCM SLC Modbus scanner) and 8193 for others (e.g. PanelViews).

Writing (06) Logic Command Data

The PowerFlex 520-series drive can be controlled through the network by sending Function Code 06 writes to register address 2000H (Logic Command). P046 [Start Source 1] must be set to 3 "Serial/DSI" in order to accept the commands. PowerFlex 523 drives support only Velocity bit definitions. PowerFlex 525 drives can use Parameter C122 [Cmd Stat Select] to select either Velocity or Position bit definitions.

TIP Powerup/Reset the drive after selecting an option for C122 [Cmd Stat Select] for the change to take effect.

Velocity Bit Definitions

Comm Logic Command – C122 = 0 "Velocity"		
Address (Decimal)	**Bit(s)**	**Description**
2000H (8192)	0	1 = Stop, 0 = Not Stop
	1	1 = Start, 0 = Not Start
	2	1 = Jog, 0 = No Jog
	3	1 = Clear Faults, 0 = Not Clear Faults
	5, 4	00 = No Command
		01 = Forward Command
		10 = Reverse Command
		11 = No Command
	6	1 = Force Keypad Control, 0 = Not Force Keypad Control
	7	1 = MOP Increment, 0 = Not Increment
	9, 8	00 = No Command
		01 = Accel Rate 1 Enable
		10 = Accel Rate 2 Enable
		11 = Hold Accel Rate Selected
	11, 10	00 = No Command
		01 = Decel Rate 1 Enable
		10 = Decel Rate 2 Enable
		11 = Hold Decel Rate Selected
	14, 13, 12	000 = No Command
		001 = Freq. Source = P047 [Speed Reference1]
		010 = Freq. Source = P049 [Speed Reference2]
		011 = Freq. Source = P051 [Speed Reference3]
		100 = A410 [Preset Freq 0]
		101 = A411 [Preset Freq 1]
		110 = A412 [Preset Freq 2]
		111 = A413 [Preset Freq 3]
	15	1 = MOP Decrement, 0 = Not Decrement

Position Bit Definitions

Comm Logic Command – C122 = 1 "Position"		
Address (Decimal)	**Bit(s)**	**Description**
2000H (8192)	0	1 = Stop, 0 = Not Stop
	1	1 = Start, 0 = Not Start
	2	1 = Jog, 0 = No Jog
	3	1 = Clear Faults, 0 = Not Clear Faults
	5, 4	00 = No Command
		01 = Forward Command
		10 = Reverse Command
		11 = No Command
	6	1 = Logic In 1
	7	1 = Logic In 2
	10, 9, 8	000 = Freq. and Position Step 0
		001 = Freq. and Position Step 1
		010 = Freq. and Position Step 2
		011 = Freq. and Position Step 3
		100 = Freq. and Position Step 4
		101 = Freq. and Position Step 5
		110 = Freq. and Position Step 6
		111 = Freq. and Position Step 7
	11	1 = Find Home
	12	1 = Hold Step
	13	1 = Pos Redefine
	14	1 = Sync Enable
	15	1 = Traverse Disable

Writing (06) Comm Frequency Command

The PowerFlex 520-series drive Comm Frequency Command can be controlled through the network by sending Function Code 06 writes to register address 2001H (Comm Frequency Command).

Comm Frequency Command

Reference	
Address (Decimal)	**Description**
2001H (8193)	Used by internal comm modules to control the reference of the drive. In units of 0.01 Hz.

Reading (03) Logic Status Data

The PowerFlex 520-series drive Logic Status data can be read through the network by sending Function Code 03 reads to register address 2100H (Logic Status). PowerFlex 523 drives support only Velocity bit definitions. PowerFlex 525 drives can use Parameter C122 [Cmd Stat Select] to select either Velocity or Position bit definitions.

Velocity Bit Definitions

Comm Logic Status – C122 = 0 “Velocity”		
Address (Decimal)	**Bit(s)**	**Description**
2100H (8448)	0	1 = Ready, 0 = Not Ready
	1	1 = Active (Running), 0 = Not Active
	2	1 = Cmd Forward, 0 = Cmd Reverse
	3	1 = Rotating Forward, 0 = Rotating Reverse
	4	1 = Accelerating, 0 = Not Accelerating
	5	1 = Decelerating, 0 = Not Decelerating
	6	Not Used
	7	1 = Faulted, 0 = Not Faulted
	8	1 = At Reference, 0 = Not At Reference
	9	1 = Main Freq Controlled by Active Comm
	10	1 = Operation Cmd Controlled by Active Comm
	11	1 = Parameters have been locked
	12	Digital Input 1 Status
	13	Digital Input 2 Status
	14	Digital Input 3 Status
	15	Digital Input 4 Status

Position Bit Definitions

Comm Logic Status – C122 = 1 “Position”		
Address (Decimal)	**Bit(s)**	**Description**
2100H (8448)	0	1 = Ready, 0 = Not Ready
	1	1 = Active (Running), 0 = Not Active
	2	1 = Cmd Forward, 0 = Cmd Reverse
	3	1 = Rotating Forward, 0 = Rotating Reverse
	4	1 = Accelerating, 0 = Not Accelerating
	5	1 = Decelerating, 0 = Not Decelerating
	6	1 = Forward Travel Position, 0 = Reverse Travel Position
	7	1 = Faulted, 0 = Not Faulted
	8	1 = At Reference, 0 = Not At Reference
	9	1 = At Position, 0 = Not At Position
	10	1 = At Home, 0 = Not At Home
	11	1 = Drive Homed, 0 = Not Drive Homed
	12	1 = Sync Hold, 0 = Not Sync Hold
	13	1 = Sync Ramp, 0 = Not Sync Ramp
	14	1 =Traverse On, 0 = Traverse Off
	15	1 = Traverse Decel, 0 = Not Traverse Decel

Reading (03) Drive Error Codes

The PowerFlex 520-series Error Code data can be read through the network by sending Function Code 03 reads to register address 2101H (Drive Error Codes).

Drive Error Codes

Logic Status		
Address (Decimal)	**Value (Decimal)**	**Description**
2101H (8449)	0	No Fault
	2	Auxiliary Input
	3	Power Loss
	4	Undervoltage
	5	Overvoltage
	6	Motor Stalled
	7	Motor Overload
	8	Heatsink Overtemperature
	9	Control Module Overtemperature
	12	HW Overcurrent (300%)
	13	Ground Fault
	15	Load Loss
	21	Output Phase Loss
	29	Analog Input Loss
	33	Auto Restart Tries
	38	Phase U to Ground Short
	39	Phase V to Ground Short
	40	Phase W to Ground Short
	41	Phase UV Short
	42	Phase UW Short
	43	Phase VW Short
	48	Parameters Defaulted
	59	Safety Open
	63	Software Overcurrent
	64	Drive Overload
	70	Power Unit Fail
	71	DSI Network Loss
	72	Option Card Network Loss
	73	Embedded EtherNet/IP Adapter Network Loss
	80	AutoTune Fail
	81	DSI Communication Loss
	82	Option Card Communication Loss
	83	Embedded EtherNet/IP Adapter Communication Loss
	91	Encoder Loss
	94	Function Loss
	100	Parameter Checksum Error
	101	External Storage
	105	Control Module Connect Error
	106	Incompatible Control-Power Module
	107	Unrecognized Control-Power Module
	109	Mismatched Control-Power Module
	110	Keypad Membrane
	111	Safety Hardware
	114	Microprocessor Failure
	122	I/O Board Fail

Drive Error Codes

Logic Status		
Address (Decimal)	**Value (Decimal)**	**Description**
2101H (8449)	125	Flash Update Required
	126	Non Recoverable Error
	127	DSI Flash Update Required

Reading (03) Drive Operational Values

The PowerFlex 520-series Drive Operational Values can be read through the network by sending Function Code 03 reads to register addresses 2102H…210AH.

Drive Operational Values

Reference	
Address (Decimal)	**Description**
2102H (8450)	Frequency Command (xxx.xx Hz)
2103H (8451)	Output Frequency (xxx.xx Hz)
2104H (8452)	Output Current (xxx.xx A)
2105H (8453)	DC-BUS Voltage (xxxV)
2106H (8454)	Output Voltage (xxx.xV)

Reading (03) and Writing (06) Drive Parameters

To access drive parameters, the Modbus register address equals the parameter number. For example, a decimal “1” is used to address Parameter b001 [Output Freq] and decimal “41” is used to address Parameter P041 [Accel Time 1].

Additional Information

See http://www.ab.com/drives/ for additional information.

Velocity StepLogic, Basic Logic and Timer/Counter Functions

Four PowerFlex 520-series logic functions provide the capability to program simple logic functions without a separate controller.

- Velocity StepLogic™ Function (specific to PowerFlex 525 drives only)

  Steps through up to eight preset speeds based on programmed logic. Programmed logic can include conditions that need to be met from digital inputs programmed as “Logic In 1” and “Logic In 2” before stepping from one preset speed to the next. A timer is available for each of the eight steps and is used to program a time delay before stepping from one preset speed to the next. The status of a digital output can also be controlled based on the step being executed.
- Basic Logic Function (specific to PowerFlex 525 drives only)

  Up to two digital inputs can be programmed as “Logic In 1” and/or “Logic In 2”. A digital output can be programmed to change state based on the condition of one or both inputs based on basic logic functions such as AND, OR, NOR. The basic logic functions can be used with or without StepLogic.
- Timer Function

  A digital input can be programmed for “Timer Start”. A digital output can be programmed as a “Timer Out” with an output level programmed to the desired time. When the timer reaches the time programmed into the output level the output will change state. The timer can be reset with a digital input programmed as “Reset Timer”.
- Counter Function

  A digital input can be programmed for “Counter In”. A digital output can be programmed as “Counter Out” with an output level programmed to the desired number of counts. When the counter reaches the count programmed into the output level the output will change state. The counter can be reset with a digital input programmed as “Reset Counter”.

TIP Use the Wizard in Connected Components Workbench to simplify setup instead of manually configuring the parameters.

Velocity StepLogic Using Timed Steps

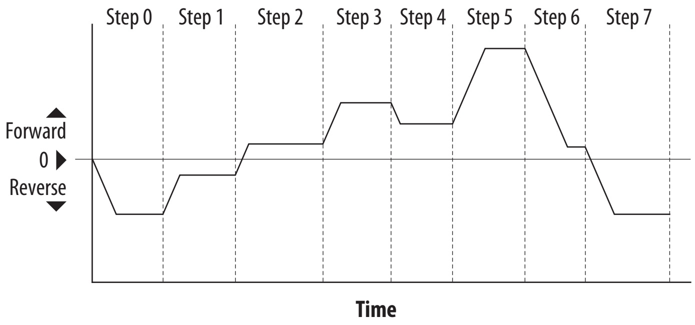
IMPORTANT	This function is specific to PowerFlex 525 drives only.

To activate this function, set one of the three speed reference sources, parameter P047, P049 or P051[Speed Referencex] to 13 "Step Logic" and activate that speed reference source. Three parameters are used to configure the logic, speed reference and time for each step.

- Logic is defined using parameters L180...L187 [Stp Logic x].
- Preset Speeds are set with parameters A410...A417 [Preset Freq 0...7].
- Time of operation for each step is set with parameters L190...L197 [Stp Logic Time x].

The direction of motor rotation can be forward or reverse.

Using Timed Steps



Velocity StepLogic Sequence

- Sequence begins with a valid start command.
- A normal sequence begins with Step 0 and transition to the next step when the corresponding StepLogic time has expired.
- Step 7 is followed by Step 0
- Sequence repeats until a stop is issued or a fault condition occurs.

Velocity StepLogic Using Basic Logic Functions

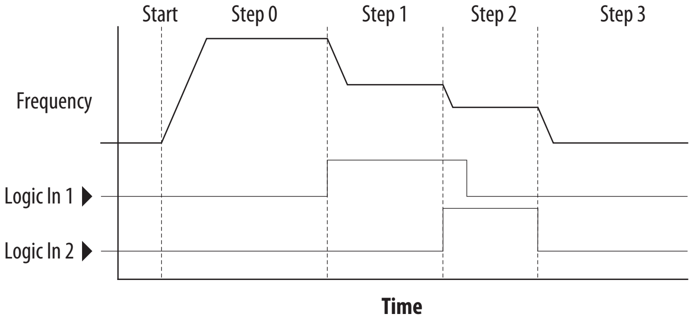
IMPORTANT	This function is specific to PowerFlex 525 drives only.

Digital input and digital output parameters can be configured to use logic to transition to the next step. Logic In 1 and Logic In 2 are defined by programming parameters t062...t063, t065...t068 [DigIn TermBlk xx] to 24 "Logic In 1" or 25 "Logic In 2".

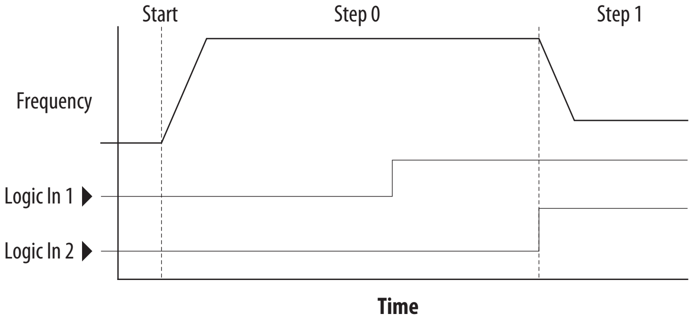
Example

- Run at Step 0.
- Transition to Step 1 when Logic In 1 is true.
  Logic senses the edge of Logic In 1 when it transitions from off to on.
  Logic In 1 is not required to remain "on".

- Transition to Step 2 when both Logic In 1 and Logic In 2 are true.
  The drive senses the level of both Logic In 1 and Logic In 2 and transitions to Step 2 when both are on.
- Transition to Step 3 when Logic In 2 returns to a false or off state.
  Inputs are not required to remain in the "on" condition except under the logic conditions used for the transition from Step 2 to Step 3.



The step time value and the basic logic may be used together to satisfy machine conditions. For instance, the step may need to run for a minimum time period and then use the basic logic to trigger a transition to the next step.



Timer Function

Digital inputs and outputs control the timer function and are configured with parameters t062...t063, t065...t068 [DigIn TermBlk xx] set to 19 "Timer Start" and 21 "Reset Timer".

Digital outputs (relay and opto type) define a preset level and indicate when the level is reached. Level parameters t077 [Relay Out1 Level], t082[Relay Out2 Level], t070 [Opto Out1 Level] and t073 [Opto Out2 Level] are used to set the desired time in seconds.

Parameters t076 [Relay Out1 Sel], t081 [Relay Out2 Sel], t069 [Opto Out1 Sel] and t072 [Opto Out2 Sel] are set to 25 "Timer Out" and causes the output to change state when the preset level is reached.

Example

- Drive starts up and accelerates to 30 Hz.
- After 30 Hz has been maintained for 20 seconds, a 4-20 mA analog input becomes the reference signal for speed control.

- The timer function is used to select a preset speed with a 20 second run time that overrides the speed reference while the digital input is active.
- Parameters are set to the following options:
  - P047 [Speed Reference1] = 6 "4-20mA Input"
  - P049 [Speed Reference2] = 7 "Preset Freq"
  - t062 [DigIn TermBlk 02] = 1 "Speed Ref 2"
  - t063 [DigIn TermBlk 03] = 19 "Timer Start"
  - t076 [Relay Out1 Sel] = 25 "Timer Out"
  - t077 [Relay Out1 Level] = 20.0 Secs
  - A411 [Preset Freq 1] = 30.0 Hz
- The control terminal block is wired such that a start command will also trigger the timer start.
- The relay output is wired to I/O Terminal 02 (DigIn TermBlk 02) so that it forces the input on when the timer starts.
- After the timer is complete, the output is turned off releasing the preset speed command. The drive defaults to following the analog input reference as programmed.

Note that a "Reset Timer" input is not required for this example since the "Timer Start" input both clears and starts the timer.

Counter Function

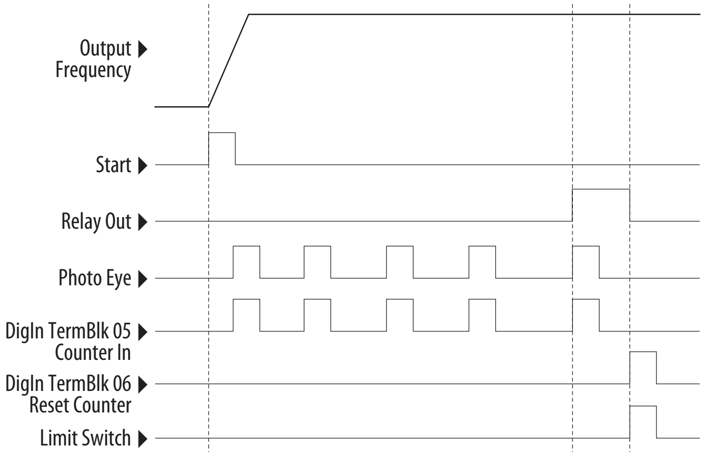
Digital inputs and outputs control the counter function and are configured with parameters t062...t063, t065...t068 [DigIn TermBlk xx] set to 20 "Counter In" and 22 "Reset Countr".

Digital outputs (relay and opto type) define a preset level and indicate when the level is reached. Level parameters t077 [Relay Out1 Level], t082[Relay Out2 Level], t070 [Opto Out1 Level] and t073 [Opto Out2 Level] are used to set the desired count value.

Parameters t076 [Relay Out1 Sel], t081 [Relay Out2 Sel], t069 [Opto Out1 Sel] and t072 [Opto Out2 Sel] are set to 26 "Counter Out" which causes the output to change state when the level is reached.

Example

- A photo eye is used to count packages on a conveyor line.
- An accumulator holds the packages until 5 are collected.
- A diverter arm redirects the group of 5 packages to a bundling area.
- The diverter arm returns to its original position and triggers a limit switch that resets the counter.
- Parameters are set to the following options:
  - t065 [DigIn TermBlk 05] = 20 "Counter In"
  - t066 [DigIn TermBlk 06] = 22 "Reset Countr"
  - t076 [Relay Out1 Sel] = 26 "Counter Out"
  - t077 [Relay Out1 Level] = 5.0 Counts


Output Frequency
Start
Relay Out
Photo Eye
DigIn TermBlk 05 Counter In
DigIn TermBlk 06 Reset Counter
Limit Switch

Velocity StepLogic Parameters

Code Descriptions for Parameters L180...L187

Digit 4	Digit 3	Digit 2	Digit 1
0	0	F	1

Digit 4 – Defines the action during the step currently executing

Setting	Accel/Decel Parameter Used	StepLogic Output State	Commanded Direction
0	1	Off	FWD
1	1	Off	REV
2	1	Off	No Output
3	1	On	FWD
4	1	On	REV
5	1	On	No Output
6	2	Off	FWD
7	2	Off	REV
8	2	Off	No Output
9	2	On	FWD
A	2	On	REV
b	2	On	No Output

Digit 3 – Defines what step to jump to or how to end program when the logic conditions specified in Digit 2 are met.

Setting	Logic
0	Jump to Step 0
1	Jump to Step 1
2	Jump to Step 2
3	Jump to Step 3
4	Jump to Step 4
5	Jump to Step 5
6	Jump to Step 6
7	Jump to Step 7
8	End Program (Normal Stop)
9	End Program (Coast to Stop)
A	End Program and Fault (F002)

Digit 2 – Defines what logic must be met to jump to a step other than the very next step.

Setting	Description	Logic
0	Skip Step (jump immediately)	SKIP
1	Step based on the time programmed in the respective [Stp Logic Time x] parameter.	TIMED
2	Step if "Logic In 1" is active (logically true)	TRUE
3	Step if "Logic In 2" is active (logically true)	TRUE
4	Step if "Logic In 1" is not active (logically false)	FALSE
5	Step if "Logic In 2" is not active (logically false)	FALSE
6	Step if either "Logic In 1" or "Logic In 2" is active (logically true)	OR
7	Step if both "Logic In 1" and "Logic In 2" is active (logically true)	AND
8	Step if neither "Logic In 1" or "Logic In 2" is active (logically true)	NOR
9	Step if "Logic In 1" is active (logically true) and "Logic In 2" is not active (logically false)	XOR
A	Step if "Logic In2" is active (logically true) and "Logic In 1" is not active (logically false)	XOR
b	Step after [Stp Logic Time x] and "Logic In 1" is active (logically true)	TIMED AND
C	Step after [Stp Logic Time x] and "Logic In 2" is active (logically true)	TIMED AND
d	Step after [Stp Logic Time x] and "Logic In 1" is not active (logically false)	TIMED OR
E	Step after [Stp Logic Time x] and "Logic In 2" is not active (logically false)	TIMED OR
F	Do not step OR no "jump to", so use Digit 0 logic	IGNORE

Digit 1 – Defines what logic must be met to jump to the very next step.

Setting	Description	Logic
0	Skip Step (jump immediately)	SKIP
1	Step based on the time programmed in the respective [Stp Logic Time x] parameter.	TIMED
2	Step if "Logic In 1" is active (logically true)	TRUE
3	Step if "Logic In 2" is active (logically true)	TRUE
4	Step if "Logic In 1" is not active (logically false)	FALSE
5	Step if "Logic In 2" is not active (logically false)	FALSE
6	Step if either "Logic In 1" or "Logic In 2" is active (logically true)	OR
7	Step if both "Logic In 1" and "Logic In 2" is active (logically true)	AND
8	Step if neither "Logic In 1" or "Logic In 2" is active (logically true)	NOR
9	Step if "Logic In 1" is active (logically true) and "Logic In 2" is not active (logically false)	XOR
A	Step if "Logic In 2" is active (logically true) and "Logic In 1" is not active (logically false)	XOR
b	Step after [Stp Logic Time x] and "Logic In 1" is active (logically true)	TIMED AND
C	Step after [Stp Logic Time x] and "Logic In 2" is active (logically true)	TIMED AND
d	Step after [Stp Logic Time x] and "Logic In 1" is not active (logically false)	TIMED OR
E	Step after [Stp Logic Time x] and "Logic In 2" is not active (logically false)	TIMED OR
F	Use logic programmed in Digit 1	IGNORE

Encoder/Pulse Train Usage and Position StepLogic Application

Encoder and Pulse Train Usage

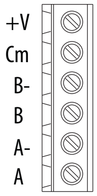
The PowerFlex 520-series drives include a pulse train input built into the terminal block. PowerFlex 525 drives also support an optional encoder card. The pulse train and encoder can be used for many of the same functions, but the pulse train supports up to 100 kHz at 24V, and uses the drive built-in terminal block. The encoder supports up to 250 kHz dual channel at 5, 12 or 24V and requires the optional encoder board to be installed. When A535 [Motor Fdbk Type] is set to a value other than zero, the drive is set to use an encoder or pulse train. The drive will use the encoder or pulse train in several ways depending on the settings of other parameters. The drive will use the encoder or pulse train as shown below (listed in order of priority):

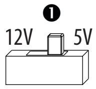
1. If enabled by P047, P049, or P051 [Speed Referencex], the encoder or pulse train will be used directly as a commanded speed (normally used with a pulse train) or as a position reference (normally used with a quadrature encoder).
2. If not enabled by the Speed Reference parameters, the encoder or pulse train can be used with the PID function if enabled by A459 or A471 [PID x Ref Sel], or A460 or A472 [PID x Fdback Sel].
3. If not enabled by the Speed Reference or PID function parameters, the encoder or pulse train can be used with A535 [Motor Fdbk Type] for direct feedback and trim of the speed command. The normal slip compensation is not used in this case. Instead the drive will use the encoder or pulse train to determine actual output frequency and adjust the output frequency to match the command. Parameters A538 [Ki Speed Loop] and A539 [Kp Speed Loop] are used in this control loop. The primary benefit of this mode is increased speed accuracy when compared to open-loop slip compensation. It does not provide speed bandwidth improvement.

IMPORTANT	The encoder usage, and position StepLogic application covered in this chapter is specific to PowerFlex 525 drives only.

Encoder Interface

The incremental encoder option card can source 5 or 12 volt power and accept 5, 12 or 24 volt single ended or differential inputs. See Appendix B for ordering information.





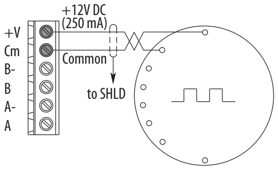
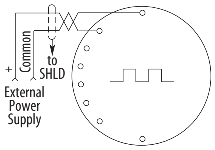
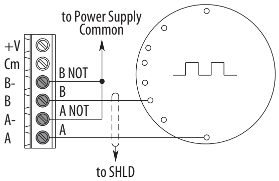
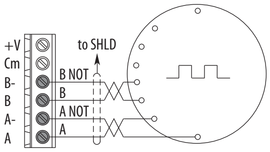
No.	Signal	Description
A	Encoder A	Single channel, pulse train or quadrature A input.
A-	Encoder A (NOT)	
B	Encoder B	Quadrature B input.
B-	Encoder B (NOT)	
Cm	Power Return	Internal power source 250 mA (isolated).
+V	5…12V Power(1)(2)	
❶	Output	DIP switch selects 12 or 5 volt power supplied at terminals "+V" and "Cm" for the encoder.

(1) When using 12V Encoder power, 24V I/O power, maximum output current at I/O Terminal 11 is 50 mA.

(2) If Encoder requires 24V power, it must be supplied by an external power source.

IMPORTANT A quadrature encoder provides rotor speed and direction. Therefore, the encoder must be wired such that the forward direction matches the motor forward direction. If the drive is reading encoder speed but the position regulator or other encoder function is not working properly, remove power to the drive and swap the A and A (NOT) encoder channels or swap any two motor leads. Drive will fault when an encoder is incorrectly wired and A535 [Motor Fdbk Type] is set to 5 "Quad Check".

Encoder Wiring Examples

I/O	Connection Example	I/O	Connection Example
Encoder Power – Internal Drive Power Internal (drive) 12V DC, 250mA	 +12V DC (250 mA) +V Cm B- B A- A Common to SHLD	**Encoder Power – External Power Source**	
Encoder Signal – Single-Ended, Dual Channel	 to Power Supply Common +V Cm B- B A- A B NOT B A NOT A to SHLD	**Encoder Signal – Differential, Dual Channel**	 +V Cm B- B A- A to SHLD B NOT B A NOT A

Wiring Notes

The encoder option card can supply 5V or 12V power (250 mA maximum) for an encoder. Be sure the DIP switch is set properly for the encoder. In general, 12V will provide higher noise immunity.

The encoder can handle 5V, 12V, or 24V inputs, but the pulse train can handle only 24V inputs. The inputs will automatically adjust to the voltage applied and no additional drive adjustment is necessary. If a single-channel input is used, it must be wired between the A (signal) and A- (signal common) channels.

IMPORTANT A quadrature encoder provides rotor speed and direction. Therefore, the encoder must be wired such that the forward direction matches the motor forward direction. If the drive is reading encoder speed but the position regulator or other encoder function is not working properly, remove power to the drive and swap the A and A (NOT) encoder channels or swap any two motor leads. Drives will fault when an encoder is incorrectly wired and A535 [Motor Fdbk Type] is set to 5 "Quad Check".

Positioning Overview

The PowerFlex 525 drive includes a simple position regulator which can be used in a variety of position applications without the need for multiple limit switches or photo-eyes. This can be used as a stand-alone controller for simple applications (up to 8 positions) or in conjunction with a controller for more flexibility.

Please note that this is not intended to replace high end servo controllers or any application that needs high bandwidth or very high torque at low speeds.

Common Guidelines for All Applications

The position regulator can be configured for operation appropriate for a variety of applications. Certain parameters will need to be adjusted in all cases.

P047 [Speed Reference1] must be set to 16 "Positioning".

A535 [Motor Fdbk Type] must be set to the match the feedback device. Positioning mode must use A535 [Motor Fdbk Type] option 4.

A535 [Motor Fdbk Type] Options

0 "None" indicates no encoder is used. This can not be used for positioning.

1 "Pulse Train" is a single channel input, no direction, speed feedback only. This should not be used for positioning. The Single Channel selection is similar to a Pulse Train, but uses the standard encoder scaling parameters.

2 "Single Chan" is a single channel input, no direction, speed feedback only. This should not be used for positioning. Single channel uses the standard encoder scaling parameters.

3 "Single Check" is a single channel input with encoder signal loss detection. The drive will fault if it detects that the input pulses do not match the expected motor speed. This should not be used for positioning.

4 "Quadrature" is a dual channel encoder input with direction and speed from the encoder. This may be used for positioning control.

5 “Quad Check” is a dual channel encoder with encoder signal loss detection. The drive will fault if it detects that the encoder speed does not match the expected motor speed.

A544 [Reverse Disable] should be set to 0 “Rev Enabled” to allow bidirectional movement necessary for position control.

P039 [Torque Perf Mode] default setting is 1 “SVC”. However, any mode can be used to improve the low speed torque for positioning applications. For best results, tune the application first. The autotune routine can be completed to further improve the drive-motor performance.

A550 [Bus Reg Enable] default setting is 1 “Enabled”. If the deceleration time is too short, the drive may overshoot the desired position. For best results, a longer deceleration time may be necessary. A550 [Bus Reg Enable] can be disabled to provide precise stopping movements, but the deceleration time will need to be manually tuned so that it is long enough to avoid F005 “OverVoltage” faults.

A437 [DB Resistor Sel] default setting is 0 “Disabled”. If improved deceleration performance is required a Dynamic Brake resistor can be used. If used, this parameter should be set to the appropriate setting for the resistor selected.

P035 [Motor NP Poles] must be set to match the number of motor poles on the motor driven by the PowerFlex 520-series drive.

A536 [Encoder PPR] must be set to match the number of pulses per revolution of the encoder used (i.e., 1024 PPR Encoder).

A559 [Counts Per Unit] sets the number of encoder counts that will be used to define one position unit. This allows the encoder positions to be defined in terms of units important to the application. For example, if 1cm of travel on a conveyor belt requires 0.75 turns of the motor, the motor encoder is 1024 PPR, and the Motor Feedback type is set to Quadrature, then this parameter would need to be set to (4 x 1024 x 0.75) = 3072 counts for one cm of travel. Then all other positions could be setup in units of “cm”.

A564 [Encoder Pos Tol] indicates the desired position tolerance for the system. This will determine how close the drive must be to the commanded position before the drive will indicate “At Home” or “At Position” in units of raw encoder pulses. This has no effect on the actual positioning control of the motor.

Positioning Operation

Parameter A558 [Positioning Mode] must be set to properly match the desired operation of the positioning function.

A558 [Positioning Mode] Options

0 “Time Steps” uses Step Logic times. This mode ignores the Step Logic settings and moves through the steps (Step 0 to Step 7 and back to Step 0) based on the times programmed into L190…L197 [Stp Logic Time x].

This can be used when the desired position is based only on time. In addition, this mode only accepts absolute positions in a positive direction from "home". This option provides an easy way to implement a simple positioning program or to test the basic positioning setup. For additional flexibility one of the other settings should be used.

1 "Preset Input" directly commands movement to any step based on the status of the digital inputs programmed for "Preset Freq". This setting ignores the Step Logic Commands settings and instead the drive will move directly to whatever step is currently commanded by A410...A425 [Preset Freq x] and L200...L214 [Step Units x]. This is useful when an application needs direct access to any position step based on discrete inputs. This mode moves in the forward direction from Home and is an absolute move.

IMPORTANT	Advanced Step Logic options such as incremental move are not available in this mode.

2 "Step Logic" provides a highly flexible mode of operation. This can be used to move through the steps (Step 0 to Step 7 and back to Step 0) or can jump to a different step at any time based on time or the status of digital inputs or communication commands. In this mode the drive always starts at Step 0 of the Step Logic profile.

3 "Preset StpL" is identical to 2 "Step Logic" except the drive will use the current status of the Preset Inputs to determine which Step Logic step to begin. This only affects the initial step. After start, the drive will move through the steps in the same manner as if setting 2 was selected.

4 "StpLogic-Lst" is identical to 2 "Step Logic" except the drive will use the step prior to its last stop command to determine which Step Logic step to begin. This only affects the initial step. After start, the drive will move through the steps in the same manner as if setting 2 was selected. This allows a process to be stopped and then restarted at the position where it stopped.

In all position modes, the following parameters will control the characteristics at each step:

L200, L202, L204, L206, L208, L210, L212 and L214 [Step Units x] are the number value to the left of the decimal (whole number) of the 8 positions desired for an application, beginning with Step 0 (L200) and continuing with each step until Step 7 (L214). For example, enter 2 into this parameter if you would like a commanded position of 2.77.

L201, L203, L205, L207, L209, L211, L213 and L215 [Step Units F x] are the number value to the right of the decimal (the portion less than 1) of the 8 positions desired for an application, beginning with Step 0 (L201) and continuing with each step until Step 7 (L215). For example, enter 0.77 into this parameter if you would like a commanded position of 2.77.

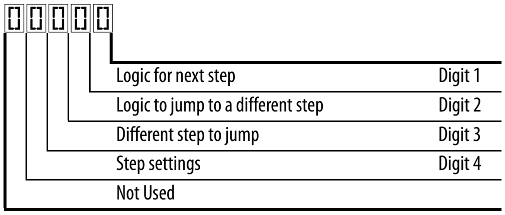
A410...A417 [Preset Freq x] are the parameters that define the maximum frequency the drive will run at during the corresponding step. For example, if [Preset Freq 2] is set to 40 Hz, the drive will accelerate to 40 Hz maximum when moving to Position 2.

Frequency Source	Step Source	Position Source
A410 [Preset Freq 0]	L180 [Stp Logic 0]	L200 [Step Units 0]
A411 [Preset Freq 1]	L181 [Stp Logic 1]	L202 [Step Units 1]
A412 [Preset Freq 2]	L182 [Stp Logic 2]	L204 [Step Units 2]
A413 [Preset Freq 3]	L183 [Stp Logic 3]	L206 [Step Units 3]
A414 [Preset Freq 4]	L184 [Stp Logic 4]	L208 [Step Units 4]
A415 [Preset Freq 5]	L185 [Stp Logic 5]	L210 [Step Units 5]
A416 [Preset Freq 6]	L186 [Stp Logic 6]	L212 [Step Units 6]
A417 [Preset Freq 7]	L187 [Stp Logic 7]	L214 [Step Units 7]

IMPORTANT The default value for A410 [Preset Freq 0] is 0.00 Hz. This value needs to be changed or the drive will not be able to move during Step 0.

L190...L197 [Stp Logic Time x] are the parameters that define the time the drive will remain in each corresponding step if that step is time-based. For example, if L192 [Stp Logic Time 2] is set to 5.0 seconds and that step is time-based, the drive will remain in Step 2 for 5.0 seconds. Note that this is the total time in that step, not the time at that position. Therefore, it will include the time needed to accelerate, run, and decelerate to that position.

L180...L187 [Stp Logic x] are the parameters that allow additional flexibility and control various aspects of each step when a positioning mode is selected that utilizes the Step Logic functions. Note that in Positioning mode these parameters have a different function than when used for normal velocity Step Logic. Each of the 4 digits controls one aspect of the each position step. The following is a listing of the available settings for each digit:


Logic for next step Digit 1
Logic to jump to a different step Digit 2
Different step to jump Digit 3
Step settings Digit 4
Not Used

Velocity Control Settings (Digit 4)

Required Setting	Accel/Decel Param. Used	StepLogic Output State	Commanded Direction
0	Accel/Decel 1	Off	FWD
1	Accel/Decel 1	Off	REV
2	Accel/Decel 1	Off	No Output
3	Accel/Decel 1	On	FWD
4	Accel/Decel 1	On	REV
5	Accel/Decel 1	On	No Output
6	Accel/Decel 2	Off	FWD
7	Accel/Decel 2	Off	REV
8	Accel/Decel 2	Off	No Output
9	Accel/Decel 2	On	FWD
A	Accel/Decel 2	On	REV
b	Accel/Decel 2	On	No Output

Positioning Settings (Digit 4)

Required Setting	Accel/Decel Param. Used	StepLogic Output State	Direction From Home	Type of Command
0	Accel/Decel 1	Off	FWD	Absolute
1	Accel/Decel 1	Off	FWD	Incremental
2	Accel/Decel 1	Off	REV	Absolute
3	Accel/Decel 1	Off	REV	Incremental
4	Accel/Decel 1	On	FWD	Absolute
5	Accel/Decel 1	On	FWD	Incremental
6	Accel/Decel 1	On	REV	Absolute
7	Accel/Decel 1	On	REV	Incremental
8	Accel/Decel 2	Off	FWD	Absolute
9	Accel/Decel 2	Off	FWD	Incremental
A	Accel/Decel 2	Off	REV	Absolute
b	Accel/Decel 2	Off	REV	Incremental
C	Accel/Decel 2	On	FWD	Absolute
d	Accel/Decel 2	On	FWD	Incremental
E	Accel/Decel 2	On	REV	Absolute
F	Accel/Decel 2	On	REV	Incremental

Settings (Digit 3)

Setting	Description
0	Jump to Step 0
1	Jump to Step 1
2	Jump to Step 2
3	Jump to Step 3
4	Jump to Step 4
5	Jump to Step 5
6	Jump to Step 6
7	Jump to Step 7
8	End Program (Normal Stop)
9	End Program (Coast to Stop)
A	End Program and Fault (F2)

Settings (Digit 2 and 1)

Setting	Description
0	Skip Step (Jump Immediately)
1	Step Based on [Stp Logic Time x]
2	Step if "Logic In 1" is Active
3	Step if "Logic In 2" is Active
4	Step if "Logic In 1" is Not Active
5	Step if "Logic In 2" is Not Active
6	Step if either "Logic In 1" or "Logic In 2" is Active
7	Step if both "Logic In 1" and "Logic In 2" are Active
8	Step if neither "Logic In 1" nor "Logic In 2" is Active
9	Step if "Logic In 1" is Active and "Logic In 2" is Not Active
A	Step if "Logic In 2" is Active and "Logic In 1" is Not Active
b	Step after [Stp Logic Time x] and "Logic In 1" is Active
C	Step after [Stp Logic Time x] and "Logic In 2" is Active
d	Step after [Stp Logic Time x] and "Logic In 1" is Not Active
E	Step after [Stp Logic Time x] and "Logic In 2" is Not Active
F	Do Not Step/Ignore Digit 2 Settings

TIP Use the Wizard in Connected Components Workbench to simplify setup instead of manually configuring the parameters.

Note: Incremental move commands will cause the drive to move the amount specified based on the current position. Absolute commands are always with reference to "Home".

A565 [Pos Reg Filter] provides a low pass filter at the input of the position regulator.

A566 [Pos Reg Gain] is a single adjustment for increasing or decreasing the responsiveness of the position regulator. For faster response, the filter should be reduced and/or the gain should be increased. For smoother response with less overshoot, the filter should be increased and/or the gain should be reduced. In general, the gain will have a larger effect on most systems than the filter.

Homing Routine

This drive supports incremental encoders only. Therefore, when the drive powers up it will reset the current position to zero. If this is known to be correct the position routine can be started without further adjustment. However, in most applications the drive will need to be "homed" after each power-up and prior to starting the position routine.

This can be accomplished in one of the following two ways:

1. Manual Homing–Program the following drive parameters:

   t062, t063, t065...t068 [DigIn TermBlk xx] = 37 "Pos Redefine"

   Program one of the digital inputs to 37 "Pos Redefine". Then, move the system into the home position with a run command, a jog command, or by manually moving the system into the home position. Then, toggle the "Pos Redefine" input. This will set the drive to "Home" at its current position and d388 [Units Traveled H] and d389 [Units Traveled L] are set to zero. Alternately, the "Pos Redefine" bit in A560 [Enh Control Word] can be toggled instead of utilizing a digital input.

IMPORTANT	The "Pos Redefine" input or bit must be returned to inactive before starting the position routine. Otherwise the drive will continuously read a position of "0" (home) and the position routine will not function correctly.

2. Automatic Homing to Limit Switch–Program the following drive parameters:

   t062, t063, t065...t068 [DigIn TermBlk xx] = 35 "Find Home"
   Program one of the digital inputs to 35 "Find Home".

   t062, t063, t065...t068 [DigIn TermBlk xx] = 34 "Home Limit"
   Program one of the digital inputs to 34 "Home Limit". Normally, the "Home Limit" input would be wired to a proximity switch or photo-eye and will indicate the system is in the home position.

   A562 [Find Home Freq] sets the frequency the drive will use while it is moving to the home position during the automatic homing routine.

   A563 [Find Home Dir] sets the direction the drive will use while it is moving to the home position during the automatic homing routine.

To begin the automatic homing routine, activate the "Find Home" input and then initiate a valid start command. The drive will then ramp to the speed set in A562 [Find Home Freq] and in the direction set in A563 [Find Home Dir] until the digital input defined as "Home Limit" is activated. If the drive passes this point too quickly it will then reverse direction at 1/10th A562 [Find Home Freq] to the point where the Home Limit switch reactivates. Approximately one second after the routine finds home the drive will stop. Alternately, the "Find Home Freq" and/or "Home Limit" bits in A560 [Enh Control Word] can be activated instead of utilizing a digital input. The inputs or bits should be returned to inactive after the routine is complete.

IMPORTANT After the position is reached the drive will stop. If the Find Home is removed before the homing is complete, the drive will begin running the position routine without the proper home. In this case Home will not be reset and the position will be in relation to the power up position.

Encoder and Position Feedback

d376 [Speed Feedback] indicates the measured speed feedback or the calculated speed feedback when no feedback device is selected. Parameter d376 [Speed Feedback] is the number value to the left of the decimal (whole number) and d377 [Speed Feedback F] is the value to the right of the decimal (the portion less than 1).

d378 [Encoder Speed] indicates the measured speed of the feedback device. This is useful if the encoder is not used for motor speed control. However, the encoder must be used for some purpose in order for d378 [Encoder Speed] to indicate a value. Parameter d378 [Encoder Speed] is the number value to the left of the decimal (whole number) and d379 [Encoder Speed F] is the number to the right of the decimal (the portion less than 1).

d388, d389 [Units Traveled x] indicate the current position of the system in terms of units away from Home. Parameter d388 [Units Traveled H] is the number value to the left of the decimal (whole number) and d389 [Units Traveled L] is the number to the right of the decimal (the portion less than 1).

d387 [Position Status] indicates the status of the positioning functions. The indication bits are:

Bit 0 "Dir Positive" indicates the current direction the drive has moved from Home.

Bit 1 "At Position" indicates whether the drive is at its commanded position. If the drive is within A564 [Encoder Pos Tol] of the commanded position, this bit will be active.

Bit 2 "At Home" indicates whether the drive is at Home. If the drive is within A564 [Encoder Pos Tol] of "Home", this bit will be active.

Bit 3 "Drive Homed" indicates whether the drive has been homed since power-up. This bit will be active once the drive has been homed either manually or automatically. It will remain active until the next power down.

Use Over Communications

If 8 steps are not adequate for the application or if dynamic program changes are required, many of the positioning functions can be controlled through an active communication network. The following parameters will allow this control.

C121 [Comm Write Mode]
Repeated writes to parameters over a communication network can cause damage to the drive EEPROM. This parameter allows the drive to accept parameter changes without writing to the EEPROM.

IMPORTANT	Parameter values set prior to setting 1 "RAM only" are saved in RAM.

C122 [Cmd Stat Select]
Selects velocity-specific or position/fibers-specific Command and Status Word bit definitions for use over a communication network.

A560 [Enh Control Word]
This parameter allows many of the positioning functions to be completed through parameter control using an explicit message. This allows the operation over communications instead of with hardware inputs. The bits have the same functions as the digital input options of the same name. Options relating to positioning are:

Bit 0 "Home Limit" indicates the drive is at the home position.

Bit 1 "Find Home" causes the drive to find home at the next start command. Deactivate this bit after completing the homing routine.

Bit 2 "Hold Step" overrides other inputs and causes the drive to remain at its current step (running at zero speed once it reaches its position) until released.

Bit 3 "Pos Redefine" resets the home position to the current position of the machine. Deactivate this bit after completing the homing routine.

Bit 4 "Sync Enable" holds the existing frequency when A571 [Sync Time] is set to enable speed synchronization. When this bit is deactivated the drive will accelerate to the new commanded frequency based on A571 [Sync Time].

Bit 5 "Traverse Dis" disables the traverse function when this bit is active.

Bit 6 "Logic In 1" provides an identical function and is logically ORed with setting 24 "Logic In 1" for t062, t063, t065...t068 [DigIn TermBlk xx]. It can be used to move through the Step Logic functions (speed or position) using comms control without requiring actual digital input transitions.

Bit 7 "Logic In 2" provides an identical function and is logically ORed with setting 25 "Logic In 2" for t062, t063, t065...t068 [DigIn TermBlk xx]. It can be used to move through the Step Logic functions (speed or position) using comms control without requiring actual digital input transitions.

L200...L214 [Step Units x]
All of the position steps can be written to while the drive is running. The changes will take place at the next move. For example, if step 0 is over-written while the drive is moving to step 0, the drive will move to the previous commanded position at step 0. The next time the drive is commanded to return to step 0 it will proceed to the new position. One possible use of this capability is when an application requires full control of the movement by a controller external to the drive. The Step Logic program might be written to jump from step 0 back to step 0 when Input 1 is active. The controller could write any desired position to step 0 and then toggle the input 1 bit of A560 [Enh Control Word] to cause the drive to move to the new position. This allows almost unlimited flexibility and can be used with absolute or incremental moves.

Setup Notes

The RA computer tool (Connected Components Workbench) can make setup of the positioning functions much easier. Refer to the latest versions for additional tools or wizards which can aid in the setup.

Notes:

PID Set Up

PID Loop

The PowerFlex 520-series drive features built-in PID (proportional, integral, derivative) control loops. The PID loop is used to maintain a process feedback (such as pressure, flow or tension) at a desired set point. The PID loop works by subtracting the PID feedback from a reference and generating an error value. The PID loop reacts to the error, based on the PID Gains, and outputs a frequency to try to reduce the error value to 0.

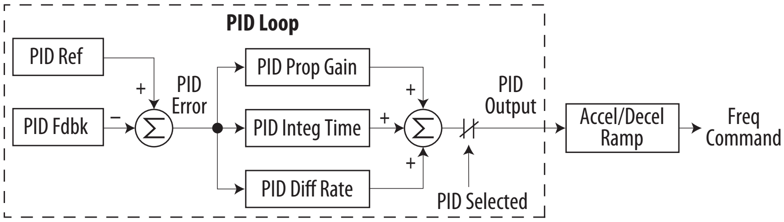
To enable the PID loop, P047, P049 or P051 [Speed Referencex] must be set to 11 "PID1 Output" or 12 "PID2 Output", and the corresponding speed reference activated.

IMPORTANT	PowerFlex 523 has one PID control loop. PowerFlex 525 has two PID control loops, of which only one can be in use at any time.

Exclusive Control and Trim Control are two basic configurations where the PID loop may be used.

Exclusive Control

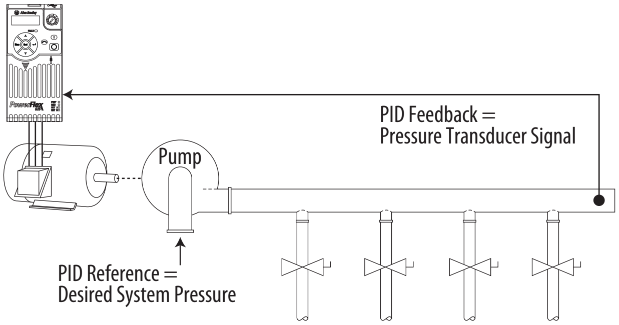
In Exclusive Control, the Speed Reference becomes 0, and the PID Output becomes the entire Freq Command. Exclusive Control is used when A458 or A470 [PID x Trim Sel] is set to option 0. This configuration does not require a master reference, only a desired set point, such as a flow rate for a pump.



Example

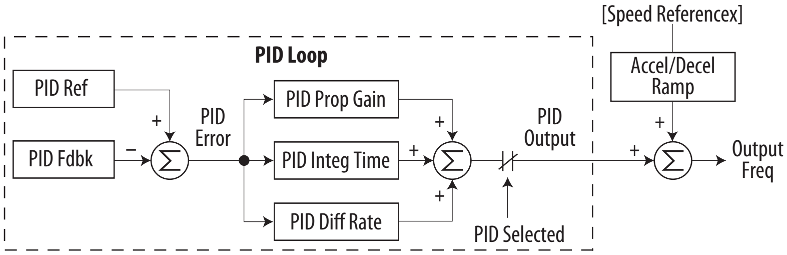
- In a pumping application, the PID Reference equals the Desired System Pressure set point.
- The Pressure Transducer signal provides PID Feedback to the drive. Fluctuations in actual system pressure, due to changes in flow, result in a PID Error value.
- The drive output frequency increases or decreases to vary motor shaft speed to correct for the PID Error value.

- The Desired System Pressure set point is maintained as valves in the system are opened and closed causing changes in flow.
- When the PID Control Loop is disabled, the Commanded Speed is the Ramped Speed Reference.


PID Feedback =
Pressure Transducer Signal
Pump
PID Reference =
Desired System Pressure

Trim Control

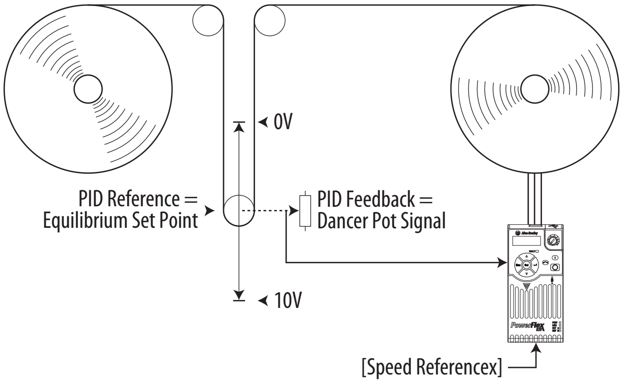
In Trim Control, the PID Output is added to the Speed Reference. In Trim mode, the output of the PID loop bypasses the accel/decel ramp as shown. Trim Control is used when A458 or A470 [PID x Trim Sel] is set to any option other than 0.


[Speed Referencex]
PID Loop
PID Ref
PID Fdbk
+
–
PID
Error
PID Prop Gain
PID Integ Time
PID Diff Rate
+
+
+
PID
Output
PID Selected
Accel/Decel
Ramp
+
+
Output
Freq

Example

- In a winder application, the PID Reference equals the Equilibrium set point.
- The Dancer Pot signal provides PID Feedback to the drive. Fluctuations in tension result in a PID Error value.
- The Master Speed Reference sets the wind/unwind speed.

- As tension increases or decreases during winding, the Speed Reference is trimmed to compensate. Tension is maintained near the Equilibrium set point.



PID Reference and Feedback

PID mode is enabled by setting P047, P049 or P051 [Speed Referencex] to 11 "PID1 Output" or 12 "PID2 Output", and activating the corresponding speed reference.

IMPORTANT	PowerFlex 523 has one PID control loop. PowerFlex 525 has two PID control loops, of which only one can be in use at any time.

If A459 or A471 [PID x Ref Sel] is not set to 0 "PID Setpoint", PID can still be disabled by select programmable digital input options (parameters t062, t063, t065...t068 [DigIn TermBlk xx]) such as "Purge".

A459, A471 [PID x Ref Sel] Options

Options	Description
0 "PID Setpoint"	A464 or A476 [PID x Setpoint] will be used to set the value of the PID Reference.
1 "Drive Pot"	The drive potentiometer will be used to set the value of the PID Reference.
2 "Keypad Freq"	The drive keypad will be used to set the value of the PID Reference.
2 "Serial/DSI"	The reference word from the Serial/DSI communication network becomes the PID Reference.
4 "Network Opt"	The reference word from a communication network option becomes the PID Reference.
5 "0-10V Input"	Selects the 0-10V Input. Note that the PID will not function with a bipolar analog input. It will ignore any negative voltages and treat them like a zero.
6 "4-20mA Input"	Selects the 4-20 mA Input.
7 "Preset Freq"	A410...A425 [Preset Freq x] will be used as an input for the PID Reference.
8 "AnlgIn Multi"(1)	The product of the 0-10V and 4-20mA Inputs will be used as an input for the PID Reference.
9 "MOP Freq"	A427 [MOP Freq] will be used as an input for the PID Reference.
10 "Pulse Input"	Pulse train will be used as an input for the PID Reference.
11 "Step Logic"(1)	Step Logic will be used as an input for the PID Reference.
12 "Encoder"(1)	Encoder will be used as an input for the PID Reference.
13 "Ethernet/IP"(1)	The reference word from the Ethernet/IP communication network becomes the PID Reference.

(1) Setting is specific to PowerFlex 525 drives only.

A460 and A472 [PID x Fdback Sel] are used to select the source of the PID feedback.

A460, A472 [PID x Fdback Sel] Options

Options	Description
0 "0-10V Input"	Selects the 0-10V Input (default setting). Note that the PID will not function with a bipolar analog input. It will ignore any negative voltages and treat them like a zero.
1 "4-20mA Input"	Selects the 4-20 mA Input.
2 "Serial/DSI"	Serial/DSI will be used as an input for the PID Feedback.
3 "Network Opt"	The reference word from a communication network option becomes the PID Reference.
4 "Pulse Input"	Pulse train will be used as an input for the PID Feedback.
5 "Encoder"(1)	Encoder will be used as an input for the PID Feedback.
6 "Ethernet/IP"(1)	Ethernet/IP will be used as an input for the PID Feedback.

(1) Setting is specific to PowerFlex 525 drives only.

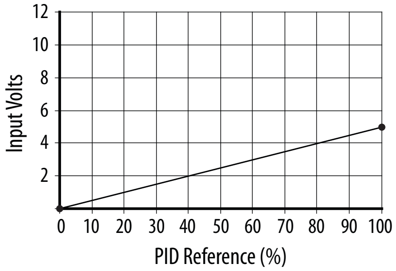
Analog PID Reference Signals

Parameters t091 [Anlg In 0-10V Lo] and t092 [Anlg In 0-10V Hi] are used to scale or invert an analog PID Reference or PID Feedback.

Scale Function

For a 0…5V signal, the following parameter settings are used so that a 0V signal = 0% PID Reference and a 5V signal = 100% PID Reference.

- t091 [Anlg In 0-10V Lo] = 0.0%
- t092 [Anlg In 0-10V Hi] = 50.0%
- A459 [PID 1 Ref Sel] = 5 "0-10V Input"

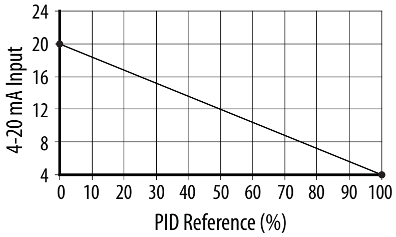


Invert Function

For a 4-20 mA signal, the following parameter settings are used so that a 20 mA signal = 0% PID Reference and a 4 mA signal = 100% PID Reference.

- t092 [Anlg In4-20mA Lo] = 100.0%
- t096 [Anlg In4-20mA Hi] = 0.0%

- A459 [PID 1 Ref Sel] = 6 “4-20mA Input”



PID Deadband

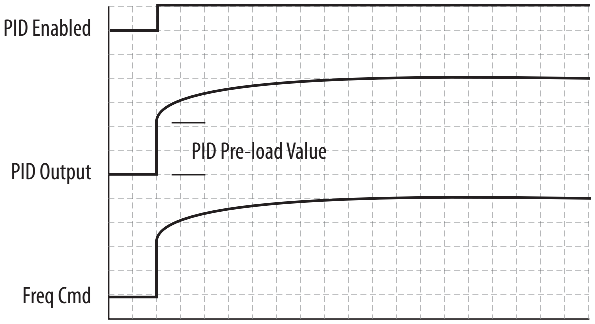
Parameters A465 and A477 [PID x Deadband] are used to set a range, in percent, of the PID Reference that the drive will ignore.

Example

- A465 [PID 1 Deadband] = 5.0%
- The PID Reference is 25.0%
- The PID Regulator will not act on a PID Error that falls between 20.0 and 30.0%

PID Preload

The value set in A466 or A478 [PID x Preload], in Hz, will be pre-loaded into the integral component of the PID at any start or enable. This will cause the drive's frequency command to initially jump to that preload frequency, and the PID loop starts regulating from there.



PID Pre-load Value > 0

PID Limits

A456 and A468 [PID x Trim Hi] and A457 and A469 [PID x Trim Lo] are used to limit the PID output and are only used in trim mode. [PID x Trim Hi] sets the maximum frequency for the PID output in trim mode. [PID x Trim Lo] sets the reverse frequency limit for the PID output in trim mode. Note that when the

PID reaches the Hi or Lo limit, the PID regulator stops integrating so that windup does not occur.

PID Gains

The proportional, integral, and differential gains make up the PID regulator.

- A461 and A473 [PID x Prop Gain]
  The proportional gain (unitless) affects how the regulator reacts to the magnitude of the error. The proportional component of the PID regulator outputs a speed command proportional to the PID error. For example, a proportional gain of 1 would output 100% of max frequency when the PID error is 100% of the analog input range. A larger value for [PID x Prop Gain] makes the proportional component more responsive, and a smaller value makes it less responsive. Setting [PID x Prop Gain] to 0.00 disables the proportional component of the PID loop.
- A462 and A474 [PID x Integ Time]
  The integral gain (units of seconds) affects how the regulator reacts to error over time and is used to get rid of steady state error. For example, with an integral gain of 2 seconds, the output of the integral gain component would integrate up to 100% of max frequency when the PID error is 100% for 2 seconds. A larger value for [PID x Integ Time] makes the integral component less responsive, and a smaller value makes it more responsive. Setting [PID x Integ Time] to 0.0 disables the integral component of the PID loop.
- A463 and A475 [PID x Diff Rate]
  The Differential gain (units of 1/seconds) affects the rate of change of the PID output. The differential gain is multiplied by the difference between the previous error and current error. Thus, with a large error the D has a large effect and with a small error the D has less of an effect. This parameter is scaled so that when it is set to 1.00, the process response is 0.1% of P044 [Maximum Freq] when the process error is changing at 1% / second. A larger value for [PID x Diff Rate] makes the differential term have more of an effect and a small value makes it have less of an effect. In many applications, the D gain is not needed. Setting [PID x Diff Rate] to 0.00 (factory default) disables the differential component of the PID loop.

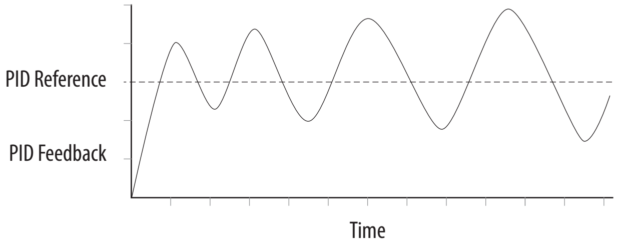
Guidelines for Adjusting the PID Gains

1. Adjust the proportional gain. During this step it may be desirable to disable the integral gain and differential gain by setting them to 0. After a step change in the PID Feedback:
   - If the response is too slow increase A461 or A473 [PID x Prop Gain].
   - If the response is too quick and/or unstable (see Unstable Response on page 221), decrease A461 or A473 [PID x Prop Gain].
   - Typically, A461 or A473 [PID x Prop Gain] is set to some value below the point where the PID begins to go unstable.

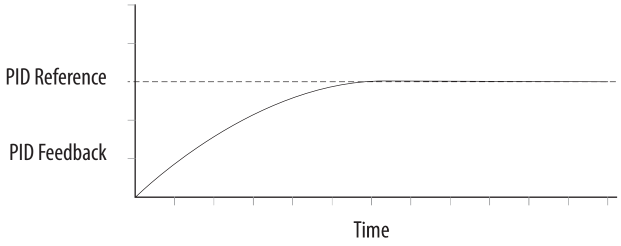
2. Adjust the integral gain (leave the proportional gain set as in Step 1). After a step change in the PID Feedback:
    - If the response is too slow (see Slow Response – Over Damped on page 221), or the PID Feedback does not become equal to the PID Reference, decrease A462 or A474 [PID x Integ Time].
    - If there is a lot of oscillation in the PID Feedback before settling out (see Oscillation – Under Damped on page 221), increase A462 or A474 [PID x Integ Time].
3. At this point, the differential gain may not be needed. However, if after determining the values for A461 or A473 [PID x Prop Gain] and A462 or A474 [PID x Integ Time]:
    - Response is still slow after a step change, increase A463 or A475 [PID x Diff Rate].
    - Response is still unstable, decrease A463 or A475 [PID x Diff Rate].

The following figures show some typical responses of the PID loop at different points during adjustment of the PID Gains.

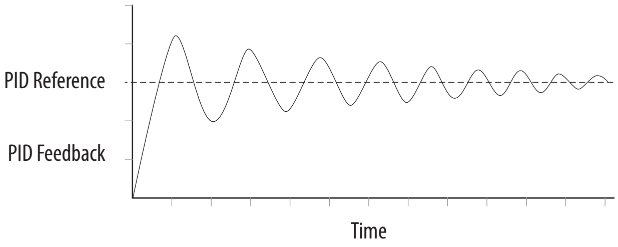
Unstable Response



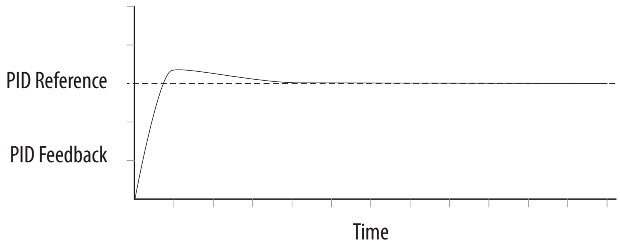
Slow Response – Over Damped



Oscillation – Under Damped



Good Response – Critically Damped



Safe-Torque-Off Function

The PowerFlex 525 Safe-Torque-Off function, when used with other safety components, helps provide protection according to EN ISO 13849 and EN62061 for safe-off and protection against restart. The PowerFlex 525 Safe-Torque-Off function is just one component in a safety control system. Components in the system must be chosen and applied appropriately to achieve the desired level of operator safeguarding.

For information on...	See page...
PowerFlex 525 Safe-Torque-Off Overview	223
EC Type Examination Certification	224
EMC Instructions	224
Using PowerFlex 525 Safe-Torque-Off	224
Enabling PowerFlex 525 Safe-Torque-Off	227
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IMPORTANT	The Safe-Torque-Off function covered in this chapter is specific to PowerFlex 525 drives only.

PowerFlex 525 Safe-Torque-Off Overview

The PowerFlex 525 Safe-Torque-Off function:

- Provides the Safe-Torque-Off (STO) function defined in EN IEC 61800-5-2.
- Blocks gate-firing signals from reaching the Insulated Gate Bipolar Transistor (IGBT) output devices of the drive. This prevents the IGBTs from switching in the sequence necessary to generate torque in the motor.
- Can be used in combination with other safety devices to fulfill the requirements of a system “safe torque off” function which satisfies Category 3 / PL (d) according to EN ISO 13849-1 and SIL CL2 according to EN/IEC 62061, IEC 61508, and EN/IEC 61800-5-2.

IMPORTANT	The function is suitable for performing mechanical work on the drive system or affected area of a machine only. It does not provide electrical safety.

⚠ **ATTENTION:** Electric Shock Hazard. Verify that all sources of AC and DC power are de-energized and locked out or tagged out in accordance with the requirements of ANSI/NFPA 70E, Part II.

To avoid an electric shock hazard, verify that the voltage on the bus capacitors has discharged before performing any work on the drive. Measure the DC bus voltage at the +DC and -DC terminals or test points (refer to your drive's User Manual for locations). The voltage must be zero.

In safe-off mode, hazardous voltages may still be present at the motor. To avoid an electric shock hazard, disconnect power to the motor and verify that the voltage is zero before performing any work on the motor.

EC Type Examination Certification

TÜV Rheinland has certified the PowerFlex 525 Safe-Torque-Off function compliant with the requirements for machines defined in Annex I of the EC Directive 2006/42/EC, and that it complies with the requirements of the relevant standards listed below:

- EN ISO 13849-1:2008 Safety of machinery – Safety related parts of control systems – Part 1: General principles for design. (PowerFlex 525 STO achieves Category 3 / PL(d))
- EN 61800-5-2:2007 Adjustable speed electrical power drive systems – Part 5-2 Safety requirements – Functional. (PowerFlex 525 STO achieves SIL CL 2)
- EN 62061:2005 Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems.
- IEC 61508 Part 1-7:2010 Functional safety of electrical/electronic/ programmable electronic safety-related systems – Parts 1-7.

TÜV also certifies that the PowerFlex 525 STO may be used in applications up to Category 3/ PL(d) according to EN ISO 13849-1 and SIL 2 according to EN 62061 / EN 61800-5-2 / IEC 61508.

The TÜV Rheinland certificate may be found at: www.rockwellautomation.com/products/certification/.

EMC Instructions

PowerFlex 525 Safe-Torque-Off function requires CE Conformity as described on page 51.

Using PowerFlex 525 Safe-Torque-Off

The PowerFlex 525 Safe-Torque-Off function is intended to be part of the safety related control system of a machine. Before use, a risk assessment should be performed that compares the PowerFlex 525 Safe-Torque-Off function specifications and all foreseeable operational and environmental characteristics of the machine to which it is to be fitted.

A safety analysis of the machine section controlled by the drive is required to determine how often the safety function should be tested for proper operation during the life of the machine.

ATTENTION: The following information is merely a guide for proper installation. Rockwell Automation cannot assume responsibility for the compliance or the noncompliance to any code, national, local or otherwise for the proper installation of this equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored during installation.

ATTENTION: In safe-off mode, hazardous voltages may still be present at the motor. To avoid an electric shock hazard, disconnect power to the motor and verify that the voltage is zero before performing any work on the motor.

ATTENTION: In the event of the failure of two output IGBTs in the drive, when the PowerFlex 525 Safe-Torque-Off has controlled the drive outputs to the off state, the drive may provide energy for up to 180° of rotation in a 2-pole motor before torque production in the motor ceases.

Safety Concept

The PowerFlex 525 Safe-Torque-Off function is suitable for use in safety applications up to and including Category 3 / PL(d) according to EN ISO 13849-1 and SIL 2 according to EN 62061 / EN 61800-5-2 / IEC 61508.

In addition, the PowerFlex 525 STO may be used together with other components in a safety application to achieve an overall Category 3 / PL(e) according to EN ISO 13849-1 and SIL 3 according to EN 62061 and IEC 61508. This is illustrated in Example 3 in this appendix.

Safety requirements are based on the standards current at the time of certification.

The PowerFlex 525 Safe-Torque-Off function is intended for use in safety-related applications where the de-energized state is considered to be the safe state. All of the examples in this manual are based on achieving de-energization as the safe state for typical Machine Safety and Emergency Shutdown (ESD) systems.

Important Safety Considerations

The system user is responsible for:

- the set-up, safety rating, and validation of any sensors or actuators connected to the system.
- completing a system-level risk assessment and reassessing the system any time a change is made.
- certification of the system to the desired safety performance level.
- project management and proof testing.
- programming the application software and the safety option configurations in accordance with the information in this manual.

- access control to the system, including password handling.
- analyzing all configuration settings and choosing the proper setting to achieve the required safety rating.

IMPORTANT When applying Functional Safety, restrict access to qualified, authorized personnel who are trained and experienced.

ATTENTION: When designing your system, consider how personnel will exit the machine if the door locks while they are in the machine. Additional safeguarding devices may be required for your specific application.

Functional Proof Test

The PFD and PFH values provided in the table below are contingent upon the Proof Test Interval (PTI). Before the end of the PTI specified in the table below, a proof test of the STO safety function must be performed in order for the specified PFD and PFH values to remain valid.

PFD and PFH Data

PFD and PFH calculations are based on the equations from Part 6 of EN 61508.

This table provides data for a 20-year proof test interval and demonstrates the worst-case effect of various configuration changes on the data.

PFD and PFH for 20-year Proof Test Interval

Attribute	Value
PFD	6.62E-05 (MTTF = 3593 years)
PFH$_D$	8.13E-10
SFF	83%
DC	62.5%
CAT	3
HFT	1 (1oo2)
PTI	20 YEARS
Hardware Type	Type A

Safety Reaction Time

The safety reaction time is the amount of time from a safety-related event as input to the system until the system is in the Safe State.

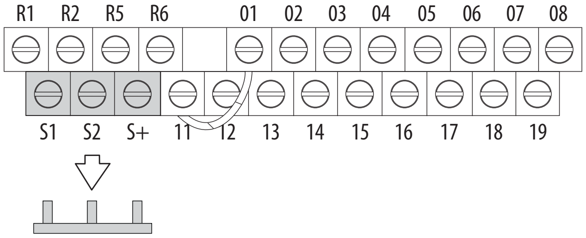
The safety reaction time from an input signal condition that triggers a safe stop, to the initiation of the configured Stop Type, is 100 ms (maximum).

Enabling PowerFlex 525 Safe-Torque-Off

1. Remove all power to the drive.

ATTENTION: To avoid an electric shock hazard, verify that the voltage on the bus capacitors has discharged before performing any work on the drive. Measure the DC bus voltage at the +DC and -DC terminals or test points (refer to your drive's user manual for the location of the terminals). The voltage must be zero.

2. Loosen the screw of terminals Safety 1, Safety 2 and Safety +24V (S1, S2, S+) on the control I/O terminal block.
3. Remove the protective jumper.



4. Safe-Torque-Off function is now enabled and the terminals are ready to function as safety inputs.

Wiring

Important points to remember about wiring:

- Always use copper wire.
- Wire with an insulation rating of 600V or greater is recommended.
- Control wires should be separated from power wires by at least 0.3 m (1 ft).

Recommended Wire

Type	Wire Type[1]	Description	Min. Insulation Rating
Shielded	Multi-conductor shielded cable such as Belden 8770 (or equiv.)	0.750 mm^2 (18 AWG), 3 conductor, shielded.	300V, 60 °C (140 °F)

(1) Recommendations are for 50 °C ambient temperature.
75 °C wire must be used for 60 °C ambient temperature.
90 °C wire must be used for 70 °C ambient temperature.

See I/O Wiring on page 38 for wiring recommendations and Control I/O Terminal Designations on page 41 for terminal descriptions.

If Safety Inputs S1 and S2 are powered by an external +24V source, apply it only in SELV system, PELV system or low voltage Class 2 circuit.

PowerFlex 525 Safe-Torque-Off Operation

The PowerFlex 525 Safe-Torque-Off function disables the drive's output IGBT's by breaking the link with the drive microcontroller. When used in combination with a safety input device, the system satisfies the requirements of EN ISO 13849 and EN62061 for safe-torque-off and helps protect against restart.

Under normal drive operation, both safety inputs (Safety 1 and Safety 2) are energized, and the drive is able to run. If either input is de-energized, the gate control circuit becomes disabled. To meet EN ISO 13849 operation, both safety channels must be de-energized. Refer to the following examples for more information.

IMPORTANT	By itself, the Safe-Torque-Off function initiates a coast to stop action. Additional protective measures will need to be applied when an application requires a change to the stop action.

Verify Operation

Test the safety function for proper operation after the initial setup of the PowerFlex 525 Safe-Torque-Off function. Retest the safety function at the intervals determined by the safety analysis described on page 224.

Verify that both safety channels are functioning according to the table below.

Channel Operation and Verification

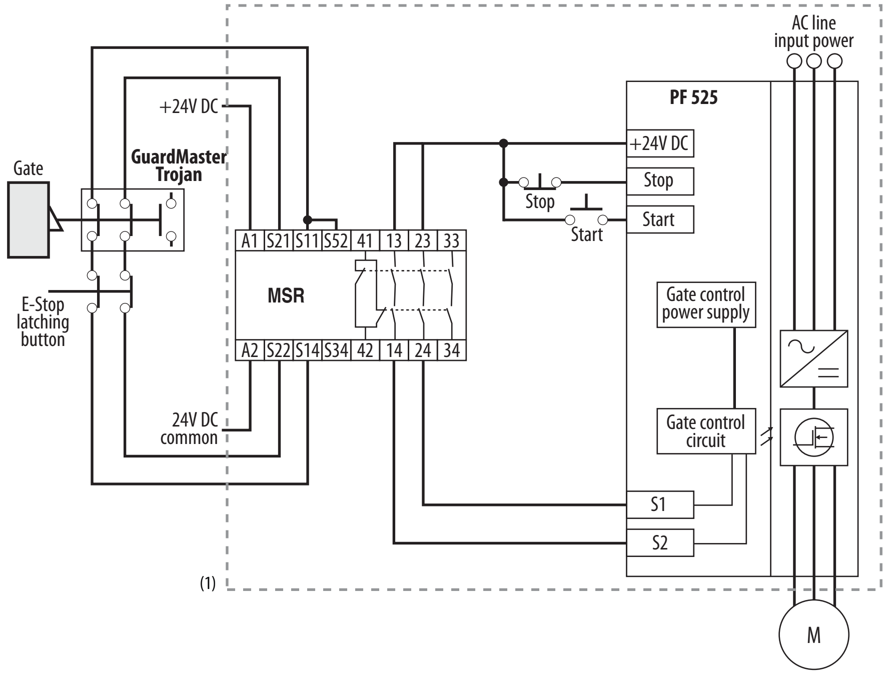
Safety Function Status	**Drive In Safe State**	**Drive In Safe State**	**Drive In Safe State**	**Drive Able To Run**
Drive Status	**Configured by t105 [Safety Open En]**	**Fault F111 (Safety Hardware)**	**Fault F111 (Safety Hardware)**	**Ready/Run**
Safety Channel Operation				
Safety Input S1	No Power Applied	Power Applied	No Power Applied	Power Applied
Safety Input S2	No Power Applied	No Power Applied	Power Applied	Power Applied

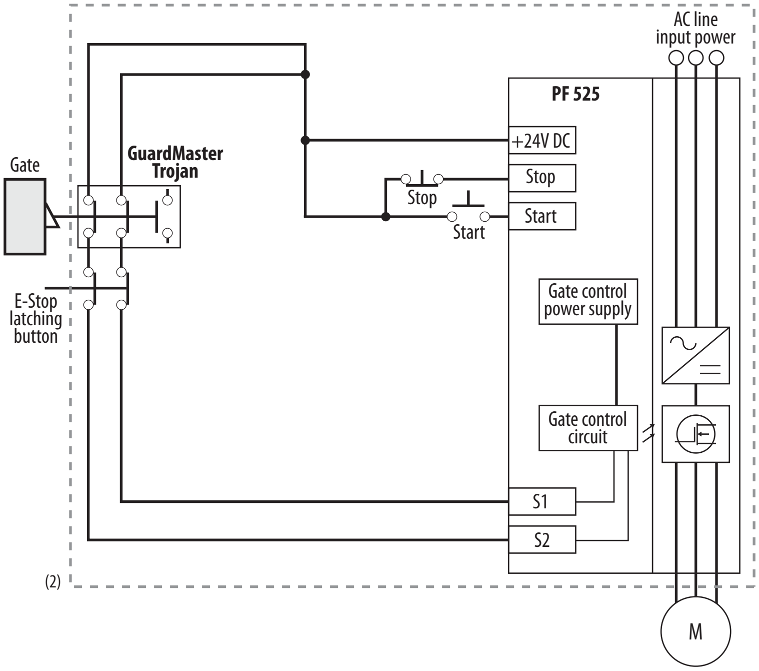
IMPORTANT	If an external fault is present on the wiring or circuitry controlling the Safety 1 or Safety 2 inputs for a period of time, the Safe-Torque-Off function may not detect this condition. When the external fault condition is removed the Safe-Torque-Off function will allow an enable condition. Fault in the external wiring shall either be detected by external logic, or excluded (wiring must be protected by cable ducting or armoring), according to EN ISO 13849-2.

Connection Examples

Example 1 – Safe-Torque-Off Connection with Coast-to-Stop Action, SIL 2/PL d

Stop Category 0 – Coast

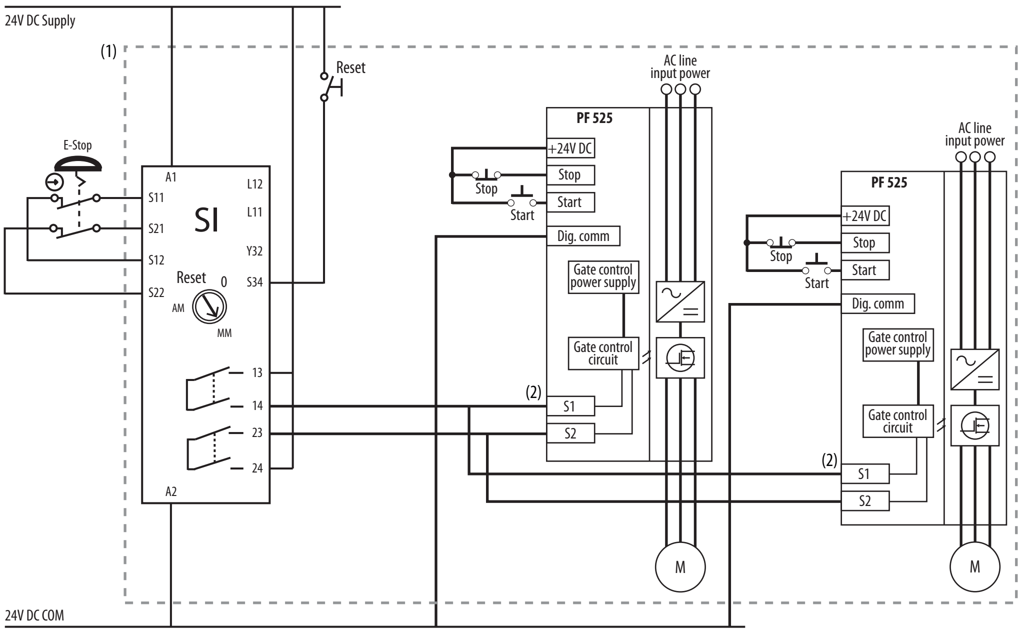

AC line input power
PF 525
+24V DC
Stop
Start
Gate control power supply
Gate control circuit
S1
S2
+24V DC
GuardMaster Trojan
Gate
Stop
Start
A1 S21 S11 S52 41 13 23 33
MSR
A2 S22 S14 S34 42 14 24 34
E-Stop latching button
24V DC common
(1)
M


AC line input power
PF 525
+24V DC
Stop
Start
Gate control power supply
Gate control circuit
S1
S2
GuardMaster Trojan
Gate
Stop
Start
E-Stop latching button
(2)
M

(1) Enclosure Recommended. Note: External wiring failure modes must be considered as described in EN ISO 13849-2. Enclosure or other measure to exclude these failure modes should be used.

(2) In some situations, a safety relay is not required if both the switch and PowerFlex 525 are installed in the same enclosure.

Stop Category 0 – Coast with Two PowerFlex 525 Drives


24V DC Supply
(1)
Reset
E-Stop
A1
S11
S21
S12
S22
SI
L12
L11
Y32
S34
Reset
0
AM
MM
13
14
23
24
A2
AC line
input power
PF 525
+24V DC
Stop
Start
Stop
Start
Dig. comm
Gate control
power supply
Gate control
circuit
(2)
S1
S2
M
AC line
input power
PF 525
+24V DC
Stop
Start
Stop
Start
Dig. comm
Gate control
power supply
Gate control
circuit
(2)
S1
S2
M
24V DC COM

(1) Enclosure Recommended. Note: External wiring failure modes must be considered as described in EN ISO 13849-2. Enclosure or other measure to exclude these failure modes should be used.
(2) Each safety input draws 6 mA from the supply.

Circuit Status

Circuit shown with guard door closed and system ready for normal drive operation.

Operating Principle

This is a dual channel system with monitoring of the Safe-Torque-Off circuit and drive. Opening the guard door will switch the input circuits (S13-S14 & S21-S22) to the Minotaur monitoring safety relay unit. The output circuits (13-14 & 23-24) will cause the Safe-Torque-Off Enable circuit to trip and the motor will coast to stop. To restart the drive, the Minotaur safety relay must first be reset followed by a valid start command to the drive.

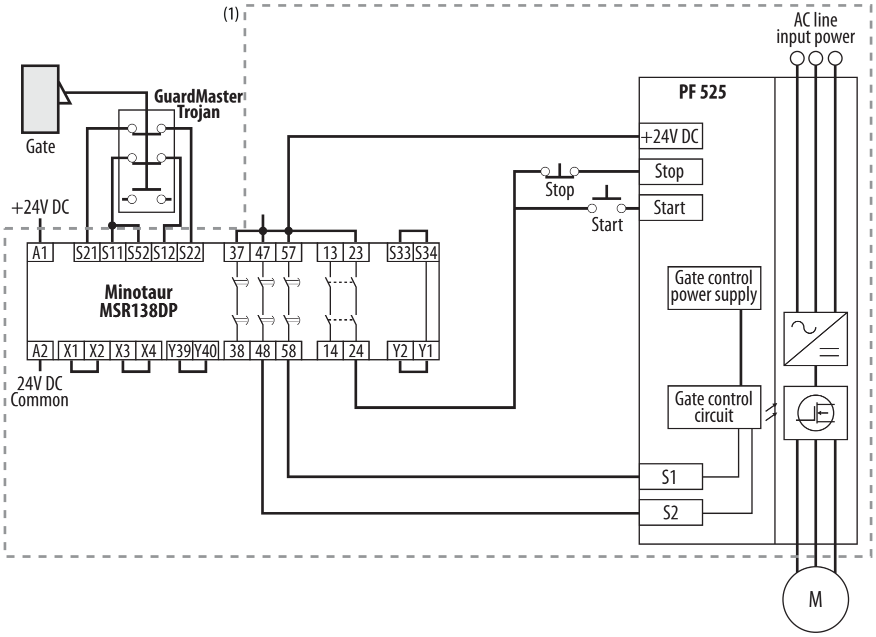
Fault Detection

A single fault detected on the Minotaur safety input circuits will result in the lock-out of the system at the next operation and will not cause loss of the safety function.

A single fault detected on the PowerFlex 525 safety enable redundant inputs will result in the lock-out of the drive and will not cause loss of the safety function.

Example 2 – Safe-Torque-Off Connection with Controlled Stop Action, SIL 2/PL d

Stop Category 1 – Controlled


(1)
AC line input power
Gate
GuardMaster Trojan
PF 525
+24V DC
Stop
Start
Stop
Start
+24V DC
A1
S21
S11
S52
S12
S22
37
47
57
13
23
S33
S34
Minotaur MSR138DP
A2
X1
X2
X3
X4
Y39
Y40
38
48
58
14
24
Y2
Y1
24V DC Common
Gate control power supply
Gate control circuit
S1
S2
M

(1) Enclosure Recommended. External wiring failure modes must be considered as described in EN ISO 13849-2. Enclosure or other measure to exclude these failure modes should be used.

Circuit Status

Circuit shown with guard door closed and system ready for normal drive operation.

Operating Principle

This is a dual channel system with monitoring of the Safe-Torque-Off circuit and drive. Opening the guard door will switch the input circuits (S11-S12 & S21-S22) to the Minotaur monitoring safety relay unit. The output circuits (13-14) will issue a Stop command to the drive and cause a controlled deceleration. After the programmed delay, the timed output circuits (47-48 & 57-58) will cause the Safe-Torque-Off Enable circuit to trip. If the motor is rotating when the trip occurs, it will coast to stop. To restart the drive, the Minotaur safety relay must first be reset followed by a valid start command to the drive.

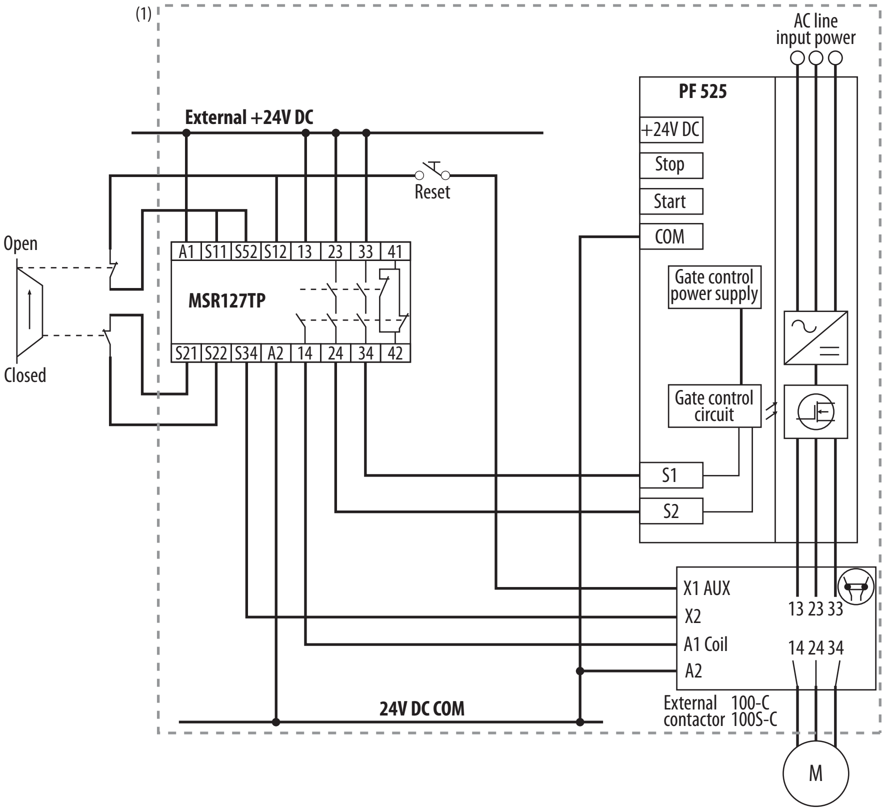
Fault Detection

A single fault detected on the Minotaur safety input circuits will result in the lock-out of the system at the next operation and will not cause loss of the safety function.

A single fault detected on the PowerFlex 525 safety enable redundant inputs will result in the lock-out of the drive and will not cause the loss of the safety function.

Example 3 – Safe-Torque-Off Connection with Coast-to-Stop Action Using External +24V supply, SIL 3/PL e

Stop Category 0 – Coast


(1)
AC line input power
PF 525
External +24V DC
+24V DC
Stop
Start
COM
Reset
Open
Closed
A1 S11 S52 S12 13 23 33 41
MSR127TP
S21 S22 S34 A2 14 24 34 42
Gate control power supply
Gate control circuit
S1
S2
X1 AUX
X2
A1 Coil
A2
13 23 33
14 24 34
24V DC COM
External contactor 100-C 100S-C
M

(1) Enclosure Recommended. External wiring failure modes must be considered as described in EN ISO 13849-2. Enclosure or other measure to exclude these failure modes should be used.

Circuit Status

Circuit shown with guard door closed and system ready for normal drive operation.

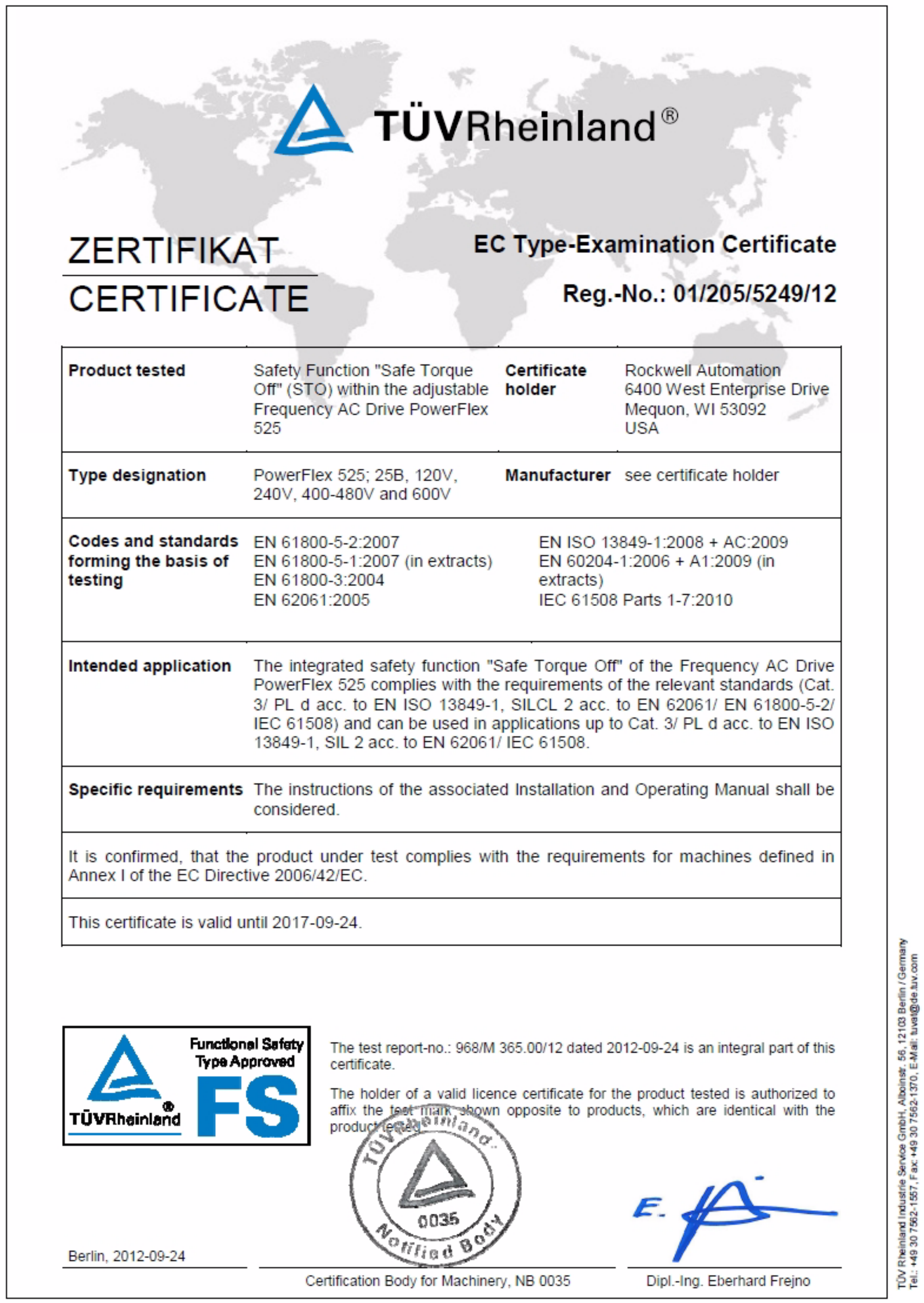
Operating Principle

This is a dual channel system with monitoring of the Safe-Torque-Off circuit and drive. Opening the guard door will switch the input circuits (S11-S12 & S21-S22) to the Minotaur monitoring safety relay unit. The output circuits (13-14 & 23-24 & 33-34) will cause the output contact and Safe-Torque-Off Enable circuit to trip and the motor will coast to stop. To restart the drive, the Minotaur safety relay must first be reset followed by a valid start command to the drive.

Fault Detection

A single fault detected on the Minotaur safety input circuits will result in the lock-out of the system at the next operation and will not cause loss of the safety function.

PowerFlex 525 Certification for Safe-Torque-Off



TÜVRheinland®

ZERTIFIKAT

CERTIFICATE

EC Type-Examination Certificate

Reg.-No.: 01/205/5249/12

Product tested	Safety Function "Safe Torque Off" (STO) within the adjustable Frequency AC Drive PowerFlex 525	**Certificate holder**	Rockwell Automation 6400 West Enterprise Drive Mequon, WI 53092 USA
Type designation	PowerFlex 525; 25B, 120V, 240V, 400-480V and 600V	**Manufacturer**	see certificate holder
Codes and standards forming the basis of testing	EN 61800-5-2:2007 EN 61800-5-1:2007 (in extracts) EN 61800-3:2004 EN 62061:2005	EN ISO 13849-1:2008 + AC:2009 EN 60204-1:2006 + A1:2009 (in extracts) IEC 61508 Parts 1-7:2010	
Intended application	The integrated safety function "Safe Torque Off" of the Frequency AC Drive PowerFlex 525 complies with the requirements of the relevant standards (Cat. 3/ PL d acc. to EN ISO 13849-1, SILCL 2 acc. to EN 62061/ EN 61800-5-2/ IEC 61508) and can be used in applications up to Cat. 3/ PL d acc. to EN ISO 13849-1, SIL 2 acc. to EN 62061/ IEC 61508.		
Specific requirements	The instructions of the associated Installation and Operating Manual shall be considered.		

It is confirmed, that the product under test complies with the requirements for machines defined in Annex I of the EC Directive 2006/42/EC.

This certificate is valid until 2017-09-24.

Functional Safety Type Approved FS TÜVRheinland®

The test report-no.: 968/M 365.00/12 dated 2012-09-24 is an integral part of this certificate.

The holder of a valid licence certificate for the product tested is authorized to affix the test mark shown opposite to products, which are identical with the product tested.

0035

Berlin, 2012-09-24

Certification Body for Machinery, NB 0035

E.

Dipl.-Ing. Eberhard Frejno

TÜV Rheinland Industrie Service GmbH, Alboinstr. 56, 12103 Berlin / Germany
Tel.: +49 30 7562-1557, Fax: +49 30 7562-1370, E-Mail: tuvat@de.tuv.com

Notes:

EtherNet/IP

This section contains only basic information to setup an EtherNet/IP connection with your PowerFlex 520-series drive. For comprehensive information about EtherNet/IP (single and dual-port) and how to use it, see the following publications:

- PowerFlex 525 Embedded EtherNet/IP Adapter User Manual, publication 520COM-UM001.
- PowerFlex 25-COMM-E2P Dual-Port EtherNet/IP IP Adapter User Manual, publication 520COM-UM003.

ATTENTION: PowerFlex 523 drives support only the 25-COMM-E2P dual-port EtherNet/IP adapter. PowerFlex 525 drives support both the embedded EtherNet/IP adapter and the 25-COMM-E2P dual-port EtherNet/IP adapter.

Establishing A Connection With EtherNet/IP

There are three methods for configuring the Ethernet IP address:

- **BootP Server** – Use BootP if you prefer to control the IP addresses of devices using a server. The IP address, subnet mask, and gateway addresses will then be provided by the BootP server.
- **Adapter Parameters** – Use adapter parameters when you want more flexibility in setting up the IP address, or need to communicate outside the control network using a gateway. The IP address, subnet mask, and gateway addresses will then come from the adapter parameters you set.
- **DHCP** (**Dynamic Host Configuration Protocol**) (only with PowerFlex 25-COMM-E2P adapter) – Use DHCP when you want additional flexibility and ease-of-use compared to BOOTP in configuring the IP address, subnet mask, and gateway address for the adapter using a DHCP server.

IMPORTANT If you are setting your network addresses manually using parameters, you must set the appropriate drive or 25-COMM-E2P adapter parameter value to 1 “Parameters”. See the respective EtherNet/IP adapter user manual for more information.

IMPORTANT Regardless of the method used to set the adapter IP address, each node on the EtherNet/IP network must have a unique IP address. To change an IP address, you must set the new value and then remove and reapply power to (or reset) the adapter.

Notes:

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